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PREFACE.

WE take pleasure in presenting the photographic fraternity, both professional and amateur, with another volume of The American Annual of Photography and Photographic Times Almanac. The present volume, though bearing the date 1894, makes its appearance in 1893, and is in reality the Columbian volume of the series. It is the eighth volume of this publication.

As in previous years, the editors have striven to make the present volume an improvement on the issue preceding, and thus adequately to record and symbolize the yearly advance in photography. This necessitated an increasing number of articles to describe the latest advances made, as well as a greater number of pictures to record the improvements in photographic illustration.

The Tables have also been augmented by new and improved formulas and other matters of

importance to practical photographers, while those published in previous volumes have been carefully revised and brought up to date.

It is proper, at this time, to speak a word also for the advertisers who have taken advantage of the increasing number of readers of our publication (the first edition this year being 20,000 copies), to place before the entire photographic fraternity the newest and best of their wares, and have thus united to make their department of the book an instructive record of progress in the manufacture of photographic apparatus and materials. This is not the least instructive or interesting portion of the book.

The final completeness of the work, therefore, depended upon the united efforts of the editors, the contributors, the illustrators and the advertisers, and to all these the success of the present volume of THE AMERICAN ANNUAL OF PHOTOGRAPHY is due.

P. S.—Many excellent contributions which arrived too late for insertion in this volume will be published in *The Photographic Times*, to whose columns we direct the reader.

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REFERENCE CALENDAR FOR THREE YEARS.

1893

	S	M	T	W	T	F	S
Jan.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
Feb.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	..	..	..	..
Mar.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	..
April	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	..	..	..	..	..	..

	S	M	T	W	T	F	S
May	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
June	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	..
July	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	..	..	..	..	..
Aug.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..

	S	M	T	W	T	F	S
Sept.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
Oct.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
Nov.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	..	..
Dec.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	..	..	..	..	..	..

1894

	S	M	T	W	T	F	S
Jan.	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
Feb.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	..	..	..
Mar.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31
April	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	..	..	..	..	..
	..	..	..	..	..	..	..

	S	M	T	W	T	F	S
May	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..
June	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
July	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..
Aug.	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	..
	..	..	..	..	..	..	..

	S	M	T	W	T	F	S
Sept.	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	..	..	..	..	..	..
Oct.	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
Nov.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	..
Dec.	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	31	..	..	..	..	..

1895

	S	M	T	W	T	F	S
Jan.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..
	..	..	..	..	..	1	2
Feb.	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	..	..
	..	..	..	..	..	1	2
Mar.	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
	31	..	..	..	..	..	..
April	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	..	..	..	..

	S	M	T	W	T	F	S
May	..	..	..	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	21	22	23	24	25
	26	27	28	29	30	31	..
June	..	..	..	..	..	..	1
	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	18	19	20	21	22
	23	24	25	26	27	28	29
	30	..	..	..	..	..	..
July	..	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	23	24	25	26	27
	28	29	30	31	..	..	..
Aug.	..	..	..	..	1	2	3
	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	20	21	22	23	24
	25	26	27	28	29	30	31

	S	M	T	W	T	F	S
Sept.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	..	..	..	..	..
Oct.	..	..	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	22	23	24	25	26
	27	28	29	30	31	..	..
Nov.	..	..	..	..	..	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	19	20	21	22	23
	24	25	26	27	28	29	30
Dec.	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	..	..	..	..

CENTURY CALENDAR.

For explanation see opposite page.

Table 1. Years 1800-1901.

For economy of space, the century prefixes "18" and "19" have been omitted.

00	01	02	03	**04**	04	05
06	07	**08**	08	09	10	11
12	12	13	14	15	**16**	16
17	18	19	**20**	20	21	22
23	**24**	24	25	26	27	**28**
28	29	30	31	**32**	32	33
34	35	**36**	36	37	38	39
40	40	41	42	43	**44**	44
45	46	47	**48**	48	49	50
51	**52**	52	53	54	55	**56**
56	57	58	59	**60**	60	61
62	63	**64**	64	65	66	67
68	68	69	70	71	**72**	72
73	74	75	**76**	76	77	78
79	**80**	80	81	82	83	84
84	85	86	87	**88**	88	89
90	91	**92**	92	93	94	95
96	96	97	98	99	00	01

Table 2. 1st day of Month.

JAN	W	Th	F	S	S	M	Tu
FEB	S	S	M	Tu	W	Th	F
MAR	S	S	M	Tu	W	Th	F
APL	Tu	W	Th	F	S	S	M
MAY	Th	F	S	S	M	Tu	W
JUNE	S	M	Tu	W	Th	F	S
JULY	Tu	W	Th	F	S	S	M
AUG	F	S	S	M	Tu	W	Th
SEP	M	Tu	W	Th	F	S	S
OCT	W	Th	F	S	S	M	Tu
NOV	S	S	M	Tu	W	Th	F
DEC	M	Tu	W	Th	F	S	S

Table 3. Days of Month.

1	S	M	Tu	W	Th	F	S	1
2	M	Tu	W	Th	F	S	S	2
3	Tu	W	Th	F	S	S	M	3
4	W	Th	F	S	S	M	Tu	4
5	Th	F	S	S	M	Tu	W	5
6	F	S	S	M	Tu	W	Th	6
7	S	S	M	Tu	W	Th	F	7
8	S	M	Tu	W	Th	F	S	8
9	M	Tu	W	Th	F	S	S	9
10	Tu	W	Th	F	S	S	M	10
11	W	Th	F	S	S	M	Tu	11
12	Th	F	S	S	M	Tu	W	12
13	F	S	S	M	Tu	W	Th	13
14	S	S	M	Tu	W	Th	F	14
15	S	M	Tu	W	Th	F	S	15
16	M	Tu	W	Th	F	S	S	16
17	Tu	W	Th	F	S	S	M	17
18	W	Th	F	S	S	M	Tu	18
19	Th	F	S	S	M	Tu	W	19
20	F	S	S	M	Tu	W	Th	20
21	S	S	M	Tu	W	Th	F	21
22	S	M	Tu	W	Th	F	S	22
23	M	Tu	W	Th	F	S	S	23
24	Tu	W	Th	F	S	S	M	24
25	W	Th	F	S	S	M	Tu	25
26	Th	F	S	S	M	Tu	W	26
27	F	S	S	M	Tu	W	Th	27
28	S	S	M	Tu	W	Th	F	28
29	S	M	Tu	W	Th	F	S	29
30	M	Tu	W	Th	F	S	S	30
31	Tu	W	Th	F	S	S	M	31

EXPLANATION OF CENTURY CALENDAR.

(See opposite page.)

To ascertain the day of the week corresponding to any date from the 1st January, 1800, to the 31st of December, 1901, both inclusive: find the given year in Table 1, and follow downward the vertical column containing it, until reaching, in Table 2, the horizontal line beginning with the given month; at the intersection of the column and line will be found the day of the week with which the month commences. In Table 3, find the vertical column beginning with that day of the week, and follow it downward until reaching the horizontal line beginning with the given day of the month; at the intersection of the column and line will be found the day of the week corresponding to the given year, month and day.

NOTE.—Leap-years will be found entered twice in Table 1; first in heavy-faced type; and afterward in ordinary characters. The first entry is to be used when the given date is in January or February of the given year; the second, (ordinary type), when falling in any other month.

EXAMPLES.—Given the 29th of February, 1824:—To find the day of the week on which it fell. Under the first entry of 24, in Table 1, and opposite Feb., in Table 2, is found Sunday. Under Sunday in Table 3, and opposite 29, is found Sunday, which is the required day of the week. Given the 22d of December, 1864:—Under the second entry of 64, in Table 1, and opposite Dec., in Table 2, is found Th. In Table 3, under Th., and opposite 22, is found Th., which is the required day of the week. Given the 12th of September, 1855:—Under 55, in Table 1, and opposite Sept., in Table 2, is found S. In Table 3, under S and opposite 12, is found W., which is the required day of the week.

ECLIPSES IN 1894.

NOTE.—*Local mean time for the latitude of New York City is used in reckoning eclipses, sunset and sunrise. Subtract four minutes to change the reckoning to Eastern standard time of 75th meridian.*

Moon's phases are calculated for Eastern standard time. "Morn." is understood to extend from Midnight to Noon; "Eve." from Noon to Midnight.

There will be four eclipses this year, two each of the Sun and Moon, and a transit of Mercury.

I.—*A partial eclipse of the Moon*, March 21, visible west of the Rocky Mountains only, where the moon sets with a very small eclipse upon its southern limb. Size, nearly 3 digits. Begins, San Francisco, 5 h. 15 m. morn.

II.—*An annular eclipse of the Sun*, April 5, invisible in America.

III.—*A partial eclipse of the Moon*, September 14–15, visible as a small eclipse upon the moon's northern limb throughout North America.

IV.—*A total eclipse of the Sun*, September 29, invisible in America.

V.—*A transit of Mercury* over the sun's disk, November 10, visible in the United States. Begins at Washington 10 h. 47 m. morn.; ends 4 h. 3 m. eve.

THE SEASONS.

SPRING begins	March 18, 10 p.m.	AUTUMN begins	September 21, 9 a.m.
SUMMER begins	June 19, 6 p.m.	WINTER begins	December 19, 11 p.m.

CHURCH DAYS.

Septuagesima	Jan. 21	Easter Sunday	March 25
Sexagesima	Jan. 28	Low Sunday	April 1
Quinquagesima	Feb. 4	Rogation Sunday	April 29
Ash Wednesday	Feb. 7	Ascension Day	May 3
Quadragesima	Feb. 11	Whitsunday (Pent.)	May 13
Mid Lent Sunday	March 25	Trinity Sunday	May 20
Palm Sunday	March 18	Corpus Christi	May 24
Good Friday	March 23	Advent Sunday	Dec. 2

CHRONOLOGICAL CYCLES.

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Roman Indiction	7

CHRONOLOGICAL ERAS.

The year 1894, which comprises the latter part of the 118th and the beginning of the 119th year of the INDEPENDENCE OF THE UNITED STATES OF AMERICA, corresponds to the year 6607 of the JULIAN PERIOD; the years 7402-7403 of the BYZANTINE ERA; the years 5654–55 of the JEWISH ERA; the year 2647 since the FOUNDATION OF ROME, according to Varro; the year 2670 of the OLYMPIADS; the year 1610 of the era of DIOCLETIAN; the year 2554 of the JAPANESE ERA; the years 1311–12 of the MOHAMMEDAN ERA.

The 1st day of January of the year 1894 is the 2,412,101st day since the commencement of the JULIAN PERIOD.

The JULIAN CALENDAR, which is still used in the Russian Empire, dates twelve days back of our own—the GREGORIAN CALENDAR. Thus a letter from St. Petersburg dated January 1st was really written on January 13th.

The Russians generally use, in official documents and frequently in business correspondence, two dates, which they call "old style" and "new style"; and in Alaska three dates have been used on their documents, because the early navigators forgot to make allowance for the crossing of the 180th meridian in sailing from Siberia to North America.

JANUARY, 1894.

1st MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
1	**1**	M	7 25	4 43
2	**2**	Tu	7 25	4 44
3	**3**	W	7 25	4 45
4	**4**	Th	7 25	4 46
5	**5**	F	7 25	4 47
6	**6**	Sa	7 25	4 48
7	**7**	§	7 25	4 49
8	**8**	M	7 24	4 50
9	**9**	Tu	7 24	4 51
10	**10**	W	7 24	4 52
11	**11**	Th	7 24	4 53
12	**12**	F	7 23	4 54
13	**13**	Sa	7 23	4 55
14	**14**	§	7 23	4 56
15	**15**	M	7 22	4 57
16	**16**	Tu	7 22	4 59
17	**17**	W	7 21	5 00
18	**18**	Th	7 21	5 01
19	**19**	F	7 21	5 02
20	**20**	Sa	7 20	5 03
21	**21**	§	7 19	5 04
22	**22**	M	7 18	5 05
23	**23**	Tu	7 17	5 07
24	**24**	W	7 17	5 08
25	**25**	Th	7 16	5 09
26	**26**	F	7 16	5 10
27	**27**	Sa	7 15	5 11
28	**28**	§	7 14	5 13
29	**29**	M	7 13	5 14
30	**30**	Tu	7 12	5 15
31	**31**	W	7 12	5 16

Moon's Phases.

New M., Jan. 6, 10 h. 0 m., eve.
First Q., Jan. 14, 7 h. 9 m., eve.
Full M., Jan. 21, 10 h. 11 m., morn.
Last Q., Jan. 28, 11 h. 51 m., morn.

FEBRUARY, 1894.

2d MONTH. 28 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
32	**1**	Th	7 11	5 18
33	**2**	F	7 10	5 19
34	**3**	Sa	7 09	5 20
35	**4**	§	7 07	5 21
36	**5**	M	7 06	5 22
37	**6**	Tu	7 05	5 23
38	**7**	W	7 04	5 25
39	**8**	Th	7 03	5 26
40	**9**	F	7 02	5 27
41	**10**	Sa	7 01	5 28
42	**11**	§	7 00	5 30
43	**12**	M	6 58	5 31
44	**13**	Tu	6 57	5 32
45	**14**	W	6 56	5 34
46	**15**	Th	6 55	5 35
47	**16**	F	6 53	5 36
48	**17**	Sa	6 52	5 37
49	**18**	§	6 51	5 39
50	**19**	M	6 49	5 40
51	**20**	Tu	6 48	5 41
52	**21**	W	6 46	5 43
53	**22**	Th	6 45	5 44
54	**23**	F	6 44	5 45
55	**24**	Sa	6 42	5 46
56	**25**	§	6 41	5 48
57	**26**	M	6 39	5 49
58	**27**	Tu	6 38	5 50
59	**28**	W	6 37	5 51

Moon's Phases.

New M., Feb. 5, 4 h. 45 m., eve.
First Q., Feb. 13, 5 h. 43 m., morn.
Full M., Feb. 19, 9 h. 16 m., eve.
Last Q., Feb. 28, 7 h. 28 m., morn.

MARCH, 1894.

3d MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
60	**1**	Th	6 35	5 53
61	**2**	F	6 34	5 53
62	**3**	Sa	6 32	5 54
63	**4**	☩	6 30	5 55
64	**5**	M	6 29	5 56
65	**6**	Tu	6 27	5 57
66	**7**	W	6 25	5 58
67	**8**	Th	6 24	5 59
68	**9**	F	6 22	6 00
69	**10**	Sa	6 20	6 01
70	**11**	☩	6 19	6 02
71	**12**	M	6 17	6 03
72	**13**	Tu	6 16	6 04
73	**14**	W	6 14	6 05
74	**15**	Th	6 12	6 06
75	**16**	F	6 11	6 08
76	**17**	Sa	6 09	6 09
77	**18**	☩	6 07	6 10
78	**19**	M	6 06	6 11
79	**20**	Tu	6 04	6 12
80	**21**	W	6 02	6 13
81	**22**	Th	6 01	6 14
82	**23**	F	5 59	6 15
83	**24**	Sa	5 58	6 16
84	**25**	☩	5 56	6 17
85	**26**	M	5 54	6 18
86	**27**	Tu	5 52	6 19
87	**28**	W	5 51	6 20
88	**29**	Th	5 49	6 21
89	**30**	F	5 47	6 22
90	**31**	Sa	5 45	6 23

Moon's Phases.

New M., March 7, 9 h. 18 m., morn.
First Q., March 14, 1 h. 28 m., eve.
Full M., March 21, 9 h. 11 m., morn.
Last Q., March 29, 3 h. 28 m., morn.

APRIL, 1894.

4th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
91	**1**	☩	5 44	6 24
92	**2**	M	5 42	6 26
93	**3**	Tu	5 41	6 27
94	**4**	W	5 39	6 28
95	**5**	Th	5 37	6 29
96	**6**	F	5 36	6 30
97	**7**	Sa	5 34	6 31
98	**8**	☩	5 33	6 32
99	**9**	M	5 31	6 33
100	**10**	Tu	5 30	6 34
101	**11**	W	5 28	6 35
102	**12**	Th	5 26	6 36
103	**13**	F	5 25	6 37
104	**14**	Sa	5 24	6 38
105	**15**	☩	5 22	6 39
106	**16**	M	5 20	6 40
107	**17**	Tu	5 19	6 41
108	**18**	W	5 17	6 42
109	**19**	Th	5 16	6 43
110	**20**	F	5 14	6 44
111	**21**	Sa	5 13	6 45
112	**22**	☩	5 11	6 46
113	**23**	M	5 10	6 47
114	**24**	Tu	5 08	6 48
115	**25**	W	5 07	6 49
116	**26**	Th	5 06	6 50
117	**27**	F	5 04	6 51
118	**28**	Sa	5 03	6 52
119	**29**	☩	5 02	6 53
120	**30**	M	5 00	6 55

Moon's Phases.

New M., April 5, 11 h. 0 m., eve.
First Q., April 12, 7 h. 32 m., eve.
Full M., April 19, 10 h. 1 m., eve.
Last Q., April 27, 10 h. 20 m., eve.

MAY, 1894.

5th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
121	**1**	Tu	4 59	6 56
122	**2**	W	4 58	6 57
123	**3**	Th	4 56	6 58
124	**4**	F	4 55	6 59
125	**5**	Sa	4 54	7 00
126	**6**	$	4 53	7 01
127	**7**	M	4 52	7 02
128	**8**	Tu	4 51	7 03
129	**9**	W	4 49	7 04
130	**10**	Th	4 48	7 05
131	**11**	F	4 47	7 06
132	**12**	Sa	4 46	7 07
133	**13**	$	4 45	7 08
134	**14**	M	4 44	7 09
135	**15**	Tu	4 43	7 10
136	**16**	W	4 42	7 11
137	**17**	Th	4 41	7 12
138	**18**	F	4 40	7 13
139	**19**	Sa	4 39	7 14
140	**20**	$	4 39	7 15
141	**21**	M	4 38	7 16
142	**22**	Tu	4 37	7 17
143	**23**	W	4 36	7 18
144	**24**	Th	4 36	7 19
145	**25**	F	4 35	7 20
146	**26**	Sa	4 34	7 20
147	**27**	$	4 34	7 21
148	**28**	M	4 33	7 22
149	**29**	Tu	4 32	7 23
150	**30**	W	4 32	7 23
151	**31**	Th	4 31	7 24

Moon's Phases.

New M., May 5, 9 h. 42 m., morn.
First Q., May 12, 1 h. 21 m., morn.
Full M., May 19, 11 h. 43 m., morn.
Last Q., May 27, 3 h. 4 m., eve.

JUNE, 1894.

6th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
152	**1**	F	4 31	7 24
153	**2**	Sa	4 30	7 25
154	**3**	$	4 30	7 26
155	**4**	M	4 30	7 26
156	**5**	Tu	4 29	7 27
157	**6**	W	4 29	7 28
158	**7**	Th	4 29	7 28
159	**8**	F	4 29	7 29
160	**9**	Sa	4 28	7 30
161	**10**	$	4 28	7 30
162	**11**	M	4 28	7 31
163	**12**	Tu	4 28	7 31
164	**13**	W	4 28	7 32
165	**14**	Th	4 28	7 32
166	**15**	F	4 28	7 32
167	**16**	Sa	4 28	7 33
168	**17**	$	4 28	7 33
169	**18**	M	4 28	7 33
170	**19**	Tu	4 28	7 34
171	**20**	W	4 29	7 34
172	**21**	Th	4 29	7 34
173	**22**	F	4 29	7 34
174	**23**	Sa	4 29	7 34
175	**24**	$	4 29	7 34
176	**25**	M	4 30	7 35
177	**26**	Tu	4 30	7 35
178	**27**	W	4 30	7 35
179	**28**	Th	4 31	7 35
180	**29**	F	4 31	7 35
181	**30**	Sa	4 32	7 35

Moon's Phases.

New M., June 3, 5 h. 56 m., eve.
First Q., June 10, 8 h. 14 m., morn.
Full M., June 18, 2 h. 6 m., morn.
Last Q., June 26, 5 h. 2 m., morn.

JULY, 1894.

7th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
182	**1**	♄	4 32	7 35
183	**2**	M	4 32	7 35
184	**3**	Tu	4 33	7 34
185	**4**	W	4 33	7 34
186	**5**	Th	4 34	7 34
187	**6**	F	4 35	7 34
188	**7**	Sa	4 35	7 33
189	**8**	♄	4 36	7 33
190	**9**	M	4 37	7 33
191	**10**	Tu	4 37	7 32
192	**11**	W	4 38	7 32
193	**12**	Th	4 39	7 31
194	**13**	F	4 39	7 31
195	**14**	Sa	4 40	7 30
196	**15**	♄	4 41	7 30
197	**16**	M	4 42	7 29
198	**17**	Tu	4 43	7 29
199	**18**	W	4 44	7 28
200	**19**	Th	4 44	7 27
201	**20**	F	4 45	7 26
202	**21**	Sa	4 46	7 26
203	**22**	♄	4 47	7 25
204	**23**	M	4 48	7 24
205	**24**	Tu	4 48	7 23
206	**25**	W	4 49	7 23
207	**26**	Th	4 50	7 22
208	**27**	F	4 51	7 21
209	**28**	Sa	4 52	7 20
210	**29**	♄	4 53	7 19
211	**30**	M	4 54	7 18
212	**31**	Tu	4 55	7 17

Moon's Phases.

New M., July 3, 0 h. 45 m., morn.
First Q., July 9, 5 h. 15 m., eve.
Full M., July 17, 5 h. 2 m., eve.
Last Q., July 25, 4 h. 7 m., eve.

AUGUST, 1894.

8th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
213	**1**	W	4 56	7 16
214	**2**	Th	4 57	7 14
215	**3**	F	4 58	7 13
216	**4**	Sa	4 59	7 12
217	**5**	♄	5 00	7 11
218	**6**	M	5 01	7 10
219	**7**	Tu	5 02	7 09
220	**8**	W	5 03	7 07
221	**9**	Th	5 04	7 06
222	**10**	F	5 05	7 05
223	**11**	Sa	5 06	7 04
224	**12**	♄	5 07	7 02
225	**13**	M	5 08	7 01
226	**14**	Tu	5 09	7 00
227	**15**	W	5 10	6 58
228	**16**	Th	5 11	6 57
229	**17**	F	5 12	6 55
230	**18**	Sa	5 13	6 54
231	**19**	♄	5 14	6 53
232	**20**	M	5 15	6 51
233	**21**	Tu	5 16	6 50
234	**22**	W	5 17	6 48
235	**23**	Th	5 17	6 47
236	**24**	F	5 18	6 45
237	**25**	Sa	5 19	6 44
238	**26**	♄	5 20	6 42
239	**27**	M	5 21	6 41
240	**28**	Tu	5 22	6 39
241	**29**	W	5 23	6 37
242	**30**	Th	5 24	6 36
243	**31**	F	5 25	6 34

Moon's Phases.

New M., Aug. 1, 7 h. 24 m., morn.
First Q., Aug. 8, 5 h. 5 m., morn.
Full M., Aug. 16, 8 h. 17 m., morn.
Last Q., Aug. 24, 0 h., 40 m., morn.
New M., Aug. 30, 3 h. 4 m., eve.

SEPTEMBER, 1894.

9th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
244	**1**	Sa	5 26	6 33
245	**2**	☵	5 27	6 31
246	**3**	M	5 28	6 29
247	**4**	Tu	5 29	6 28
248	**5**	W	5 30	6 26
249	**6**	Th	5 31	6 25
250	**7**	F	5 32	6 23
251	**8**	Sa	5 33	6 21
252	**9**	☵	5 34	6 20
253	**10**	M	5 35	6 18
254	**11**	Tu	5 36	6 16
255	**12**	W	5 37	6 15
256	**13**	Th	5 38	6 13
257	**14**	F	5 39	6 11
258	**15**	Sa	5 40	6 09
259	**16**	☵	5 41	6 08
260	**17**	M	5 42	6 06
261	**18**	Tu	5 43	6 04
262	**19**	W	5 44	6 03
263	**20**	Th	5 45	6 01
264	**21**	F	5 46	5 59
265	**22**	Sa	5 47	5 58
266	**23**	☵	5 48	5 56
267	**24**	M	5 49	5 55
268	**25**	Tu	5 50	5 53
269	**26**	W	5 51	5 52
270	**27**	Th	5 52	5 50
271	**28**	F	5 53	5 48
272	**29**	Sa	5 54	5 46
273	**30**	☵	5 54	5 44

Moon's Phases.

First Q., Sept. 6, 8 h. 3 m., eve.
Full M., Sept. 14, 11 h. 21 m., eve.
Last Q., Sept. 22, 7 h. 32 m., morn.
New M., Sept. 29, 0 h. 44 m , morn.

OCTOBER, 1894.

10th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
274	**1**	M	5 56	5 43
275	**2**	Tu	5 57	5 41
276	**3**	W	5 58	5 39
277	**4**	Th	5 59	5 38
278	**5**	F	6 00	5 36
279	**6**	Sa	6 01	5 35
280	**7**	☵	6 02	5 33
281	**8**	M	6 03	5 31
282	**9**	Tu	6 04	5 30
283	**10**	W	6 05	5 28
284	**11**	Th	6 07	5 27
285	**12**	F	6 08	5 25
286	**13**	Sa	6 09	5 23
287	**14**	☵	6 10	5 22
288	**15**	M	6 11	5 20
289	**16**	Tu	6 12	5 19
290	**17**	W	6 13	5 17
291	**18**	Th	6 14	5 16
292	**19**	F	6 15	5 14
293	**20**	Sa	6 16	5 13
294	**21**	☵	6 18	5 12
295	**22**	M	6 19	5 10
296	**23**	Tu	6 20	5 09
297	**24**	W	6 21	5 07
298	**25**	Th	6 22	5 06
299	**26**	F	6 23	5 04
300	**27**	Sa	6 24	5 03
301	**28**	☵	6 26	5 02
302	**29**	M	6 27	5 01
303	**30**	Tu	6 28	4 59
304	**31**	W	6 29	4 58

Moon's Phases.

First Q., Oct. 6, 2 h. 1 m., eve.
Full M., Oct. 14, 1 h. 41 m., eve.
Last Q., Oct. 21, 1 h. 56 m., eve.
New M., Oct. 28, 0 h. 57 m., eve.

NOVEMBER, 1894.

11th MONTH. 30 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
305	**1**	Th	6 30	4 57
306	**2**	F	6 31	4 56
307	**3**	Sa	6 32	4 54
308	**4**	☧	6 34	4 53
309	**5**	M	6 35	4 52
310	**6**	Tu	6 36	4 51
311	**7**	W	6 37	4 50
312	**8**	Th	6 38	4 49
313	**9**	F	6 40	4 48
314	**10**	Sa	6 41	4 47
315	**11**	☧	6 42	4 46
316	**12**	M	6 43	4 45
317	**13**	Tu	6 44	4 44
318	**14**	W	6 46	4 43
319	**15**	Th	6 47	4 42
320	**16**	F	6 48	4 41
321	**17**	Sa	6 49	4 40
322	**18**	☧	6 50	4 39
323	**19**	M	6 51	4 39
324	**20**	Tu	6 53	4 38
325	**21**	W	6 54	4 38
326	**22**	Th	6 55	4 37
327	**23**	F	6 56	4 36
328	**24**	Sa	6 57	4 36
329	**25**	☧	6 58	4 35
330	**26**	M	6 59	4 35
331	**27**	Tu	7 00	4 35
332	**28**	W	7 02	4 34
333	**29**	Th	7 03	4 34
334	**30**	F	7 04	4 34

Moon's Phases.

First Q., Nov. 5, 10 h. 16 m., morn.
Full M., Nov. 13, 2 h. 49 m., morn.
Last Q., Nov. 19, 8 h. 9 m., eve.
New M., Nov. 27, 3 h. 54 m., morn.

DECEMBER, 1894.

12th MONTH. 31 DAYS.

Day of Year.	Day of Month.	Day of Week.	N. Y. City. Sun rises. H. M.	N. Y. City. Sun sets. H. M.
335	**1**	Sa	7 05	4 34
336	**2**	☧	7 06	4 33
337	**3**	M	7 07	4 33
338	**4**	Tu	7 08	4 33
339	**5**	W	7 09	4 32
340	**6**	Th	7 10	4 32
341	**7**	F	7 11	4 32
342	**8**	Sa	7 12	4 32
343	**9**	☧	7 13	4 32
344	**10**	M	7 14	4 32
345	**11**	Tu	7 15	4 32
346	**12**	W	7 15	4 32
347	**13**	Th	7 16	4 33
348	**14**	F	7 16	4 33
349	**15**	Sa	7 17	4 33
350	**16**	☧	7 18	4 33
351	**17**	M	7 18	4 33
352	**18**	Tu	7 19	4 34
353	**19**	W	7 20	4 34
354	**20**	Th	7 20	4 35
355	**21**	F	7 21	4 35
356	**22**	Sa	7 21	4 36
357	**23**	☧	7 22	4 37
358	**24**	M	7 22	4 37
359	**25**	Tu	7 23	4 38
360	**26**	W	7 23	4 39
361	**27**	Th	7 23	4 39
362	**28**	F	7 23	4 40
363	**29**	Sa	7 24	4 40
364	**30**	☧	7 24	4 41
365	**31**	M	7 24	4 42

Moon's Phases.

First Q., Dec. 5, 7 h. 15 m., morn.
Full M., Dec. 12, 2 h. 46 m., eve.
Last Q., Dec. 19, 6 h. 15 m., morn.
New M., Dec. 26, 9 h., 20 m., eve.

STANDARD TIME.

For the convenience of the traveling public, the railroads of the United States and the Dominion of Canada on the 18th of November, 1883, adopted an arrangement by which 5 time-standards take the place of the 54 previously used in preparing their time-tables.

The standards adopted with names by which they are distinguished, and their distance in longitude and consequent difference in time from Greenwich are shown by the following table.

Name.	Central Meridian		Hours.	
Intercolonial	60°	West	4	Slower
Eastern	75°		5	
Central	90°	from	6	than
Mountain	105°		7	
Pacific	120°	Greenwich.	8	Greenwich.

There are thus formed five "Time Belts," each comprising the area lying within 7½ degrees on each side of the different meridians, and measuring approximately 700 miles in breadth. In each of these time-belts, the standard time is one hour faster than in the adjoining time-belt on the West, and one hour slower than in that adjoining on the East. The boundary lines between the different time-belts are not strictly geographical, being arranged to correspond with important railroad points, as follows:—

Intercolonial Times is practically disregarded, as the country included lies so far to the eastward.

Eastern Time prevails over the whole section east of a line drawn from Buffalo, N. Y., through Pittsburgh, Pa.; Parkersburgh and Huntington, W. Va.; Bristol, Tenn., and Augusta, Ga., changing at these places (except Grand Trunk, of Canada, which changes at Sarnia) to

Central Time which extends to the irregular line drawn from Brandon, Man., through Mandan, Dak.; North Platte, Neb.; Dodge City, Kan., to El Paso, New Mexico. West of this line,

Mountain Time is in use, and covers the district up to another line, which, starting from Heron, Mont., passes through Ogden, Utah, to Yuma, Ariz.

Pacific Time is used from this line to the Pacific Ocean.

The Standards adopted by the Railroads have also been very generally adopted by the cities and towns throughout the country in place of the local time; from which it may differ by nearly thirty minutes fast or slow, according as the locality is east or west of the standard meridian. The exact *plus* or *minus* correction to be applied in changing from local to standard time or *vice versa* may be easily calculated in the following manner:—Reduce the longitude of the given locality to time (by multiplying the degrees, minutes and seconds by 4, which gives hours, minutes and seconds) and subtract the longitude of the given meridian from it. For example, the longitude of Boston is 71° 4′ = 4h. 44m. Subtracting the longitude of the Eastern Standard Meridian 75° = 5h. from this, gives a *minus* result of 3° 56′ or 15m. 44sec. (say 16m.), as the difference by which Boston local meantime is faster than the Eastern Standard. In a similar manner, the local time of a place 3° 56′ West of the meridian, that is, long. 78° 56′ west, would be 15m. 44 sec. slow.

The following table gives the correction for a number of the principal cities of the continent.

Standard Time Table.

Correction to be applied to local mean time to obtain standard time.

	Standard	Correction.		Standard	Correction.		Standard	Correction.
		m.			m.			m.
Eastport, Me.	Intercol.	+28	Columbia, S. C.	Eastern	+24	Memphis, Tenn.	Central.	—
Portland, Me.	Eastern.	—19	Columbus, O.	Central.	—28	Mobile, Ala.	"	— 8
Montpelier, Vt.	"	—10	Detroit, Mich.	"	—28	New Orleans, La.	"	—
Boston, Mass.	"	—16	Indianapolis, Ind.	"	—16	Austin, Tex.	"	+31
Springfield, Mass.	"	—10	Chicago, Ill.	"	—10	Cheyenne, Wyo.	Mount'n.	— 1
Providence, R. I.	"	—14	Springfield, Ill.	"	— 2	Denver, Col.	"	—
Hartford, Conn.	"	— 9	Galena, Ill.	"	+ 2	Santa Fé, N. Mex	"	+ 4
Albany, N. Y.	"	— 5	Milwaukee, Wis.	"	— 8	Helena, Montana	"	—28
New York, N. Y.	"	— 4	St. Paul, Minn.	"	+12	Virginia City, N.	Pacific.	— 2
Utica, N. Y.	"	+ 1	St. Louis, Mo.	"	+ 1	San Francisco, C.	"	+10
Rochester, N. Y.	"	+11	Lawrence, Kan.	"	+21	Portland Ore.	"	+11
Philadelphia, Pa.	"	+ 1	Omaha, Neb.	"	+24	Quebec, Quebec.	Eastern.	—15
Harrisburg, Pa.	"	+ 7	Bismark, Dakota.	"	+43	Montreal, Quebec	"	— 6
Pittsburg, Pa.	"	+20	Savannah, Ga.	"	—36	Ottawa, Ont.	"	+ 3
Baltimore, Md.	"	+ 6	Milledgeville, Ga	"	—27	Toronto, Ont.	"	+18
Washington, D.C	"	+ 8	Jacksonville, Fla.	"	—33			
Wheeling, W.Va.	"	+23	Louisville, Ky.	"	—18			

DIFFERENCE IN TIME (For Cable Purposes),

Between New York and some of the Principal Commercial Cities of the World.

This Table is Approximate; the odd seconds are not given.

	H.M.		H.M.		H.M.		H.M.
Aden	7.56 F	Brussels	5.14 F	Gibraltar	4.35 F	Moscow	7.25 F
Alexandria..	6.56 F	Buenos Ayres.	1.02 F	Greenwich	4.56 F	Panama.....	.12 S
Algiers	5.08 F	Cadiz	4.27 F	Hamburg	5.36 F	Paris	5.02 F
Amsterdam..	5.16 F	Calcutta	10.50 F	Havana	.33 S	Rio de Janeiro.	2 03 F
Antwerp ...	5.13 F	Canton	11.31 S	Hong Kong...	11.27 S	Rome	5.46 F
Athens.... .	6.31 F	Cape Town...	6.10 F	Lisbon.....	4.19 F	St. Petersburg.	6.57 F
Bahia.....	2.34 F	Christiania ...	5.39 F	Liverpool.....	4.44 F	Stockholm	6.08 F
Berlin.....	5.50 F	Constantinople	6.53 F	London	4.56 F	Sidney	9.59 F
Berne	5.26 F	Copenhagen ..	5 46 F	Madrid	4.42 F	Valparaiso.....	.10 F
Bombay	9.48 F	Dublin.....	4.31 F	Melbourne....	9.14 F	Vera Cruz.....	1.29 S
Bordeaux ...	4.53 F	Edinburgh....	4.43 F	Mexico City...	1.40 S	Vienna.....	6.01 F
Bremen.....	5.31 F	Geneva.....	5.21 F	Montevideo...	1.11 F	Yokohama ...	10.45 S

F—*Fast of N. Y. Time.* S—*Slow of N. Y. Time.*

The difference in time is calculated on actual New York Mean Time, 74° of longitude west of Greenwich. For the new Standard Time, 75th Meridian west of Greenwich, for places west of New York, subtract 4 minutes; for places east of New York, add 4 minutes.

LEGAL HOLIDAYS IN THE VARIOUS STATES.

January 1. New Year's Day: In Alabama, Arkansas, California, Colorado, Connecticut, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Michigan, Missouri, Nevada, New Jersey, New York, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, West Virginia, Wisconsin, and Wyoming.

January 8. Anniversary of the Battle of New Orleans: In Louisiana.

* February 22. Washington's Birthday: In Alabama, California, Colorado, Connecticut, Georgia, Idaho, Illinois, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nevada, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Texas, Utah, Virginia, Wisconsin, and Wyoming.

February 6. Mardi Gras: In Louisiana.

March 2. Anniversary of Texan Independence: In Texas.

March 4. Firemen's Anniversary: In New Orleans, La.

March 23, 1894. Good Friday: In Louisiana, Maryland, and Pennsylvania.

April 21. Anniversary of the Battle of San Jacinto: In Texas.

* April 26. Memorial Day: In Georgia.

May 30. Decoration Day: In California, Colorado, Connecticut, Iowa, Illinois, Kansas, Kentucky, Massachusetts, Michigan, Nevada, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Wisconsin, and Wyoming.

July 4. Independence Day: In all the States except Nebraska.

September 3, 1894. Labor Day: In Colorado, Connecticut, Illinois, Iowa, Kansas, Maine, Massachusetts, Montana, Nebraska, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, and Tennessee.

November 6, 1894. General Election Day: In California, Kansas, Maryland, Missouri, New Hampshire, New Jersey, New York, North Dakota, Ohio, Oregon, South Carolina, South Dakota, and Wisconsin.

November 29, 1894. Thanksgiving: Is observed in all the States, though in Nebraska and some others it is not a statutory holiday.

December 25. Christmas Day: In all the States except Nebraska.

Sundays and Fast Days (whenever appointed) are legal holidays in nearly all the States.

Arbor Day is a legal holiday in Idaho and Kansas, the day being set by the Governor. Arbor Day is also a legal holiday in Rhode Island, but does not affect the payment of notes, etc.

In Minnesota, Washington's Birthday is the only general holiday expressly provided by law. As to the maturity of bills and notes, the following days are by implication holidays: Thanksgiving Day, Good Friday, Christmas, January 1st, and July 4th; as to schools—Christmas, January 1st, July 4th, Memorial Day, and Thanksgiving Day.

In Nebraska, there are no legal holidays established by statute. The same is the case in New Mexico.

Every Saturday after 12 o'clock noon is a legal holiday in New York.

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* *NOTE.*—Holidays falling on Sunday are usually kept on the Monday following.

WEATHER INDICATIONS.

Sunset Colors.—A gray, lowering sunset, or one where the sky is green, or yellowish green, or any unusual color, indicates rain. A red sunrise, with clouds lowering later in the morning, also indicates rain.

Halo (Sun Dogs).—By halo we mean the large circles, or parts of circles, about the sun or moon. A halo occurring after fine weather indicates a storm.

Corona.—By this term we mean the small colored circles frequently seen around the sun or moon. A corona growing smaller indicates rain; growing larger, fair weather.

Rainbows.—A morning rainbow is regarded as a sign of rain; an evening rainbow, of fair weather.

Sky Color.—A deep blue color of the sky, even when seen through clouds, indicates fair weather; a growing whiteness, an approaching storm.

Fog.—If arising in morning, indicates fair day; if forms during night, indicates unsettled conditions. A morning fog usually breaks away before noon.

Visibility.—Unusual clearness of the atmosphere, unusual brightness or twinkling of the stars, indicates rain.

Clouds.—In observing clouds, we observe their kinds, motions, and outlines. The clouds frequently called ' mare's tales" we term Cirri. They are marked by their light texture, fibrous and sundered as in the "mare's tail," or interlacing, as in the far-spreading white cloud, which produces the halo. Small, regularly formed groups of these clouds are frequently seen in fair and settled weather. The Cirri are also the clouds on the forepart of the storm. In this case they are usually more abundant, their outline is very ragged, and they gradually blend into a white, far-reaching cloud bank. The cloud well known as "cotton bales," or "thunder heads," we term cumulus. When they appear during the heat of the day and pass away in the evening, continued fair weather may be expected. When they increase with rapidity, sink into the lower part of the atmosphere, and remain as the evening approaches, rain is at hand. If loose patches appear thrown out from their surfaces, showers may be expected. The clouds usually seen after nightfall, lying in one horizontal plane, and not of great extent, are attendant on fine weather. Small, black, inky clouds and dark scud indicate rain.

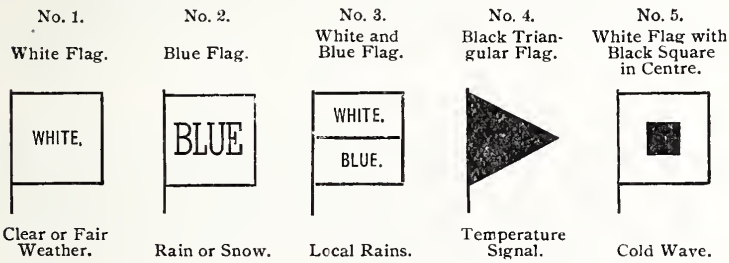
Frost.—The first frost and last frost are usually preceded by a temperature very much above the mean.

EXPLANATION OF THE FLAG AND WHISTLE SIGNALS

ADOPTED BY THE UNITED STATES WEATHER BUREAU.

1. The Weather Bureau furnishes, when practicable, for the benefit of the general public and those interests dependent to a greater or less extent upon weather conditions, the "Forecasts" which are prepared daily, at 8 A.M. and 8 P.M., for the following day. These weather forecasts are telegraphed by observers at stations of the Weather Bureau to railway officials, and many others, and are so worded as to be readily communicated to the public by means of flags or steam whistles. The flags adopted for this purpose are five in number, and of the form and dimensions indicated below:

EXPLANATION OF FLAG SIGNALS.



Number 1, white flag, six feet square, indicates clear or fair weather. Number 2, blue flag, six feet square, indicates rain or snow. Number 3, white and blue flag (parallel bars of white and blue), six feet square, indicates that local rains or showers will occur, and that the rainfall will not be general. Number 4, black triangular flag, four feet at the base and six feet in length, always refers to temperature; when placed above numbers 1, 2, or 3 it indicates warmer weather; when placed below numbers 1, 2, or 3 it indicates colder weather; when not displayed, the indications are that the temperature will remain stationary, or that the change in temperature will not vary more than four degrees from the temperature of the same hour of the preceding day from March to October, inclusive, and not more than six degrees for the remaining months of the year. Number 5, white flag, six feet square, with black square in centre, indicates the approach of a *sudden* and *decided* fall in temperature. This signal is not to be displayed unless it is expected that the temperature will fall to 42 degrees, or lower, and is usually ordered at least twenty-four

hours in advance of the cold wave. When number 5 is displayed, number 4 is always omitted.

2. When displayed on poles the signals should be arranged to read downward; when displayed from horizontal supports a small streamer should be attached to indicate the points from which the signals are to be read.

Interpretation of Displays.

No. 1, alone, indicates fair weather, stationary temperature.
No. 2, alone, indicates rain or snow, stationary temperature.
No. 3, alone, indicates local rain, stationary temperature.
No. 1, with No. 4 above it, indicates fair weather, warmer.
No. 1, with No. 4 below it, indicates fair weather, colder.
No. 2, with No. 4 above it, indicates warmer weather, rain or snow.
No. 2, with No. 4 below it, indicates colder weather, rain or snow.
No. 3, with No. 4 above it, indicates warmer weather with local rains.
No. 3, with No. 4 below it, indicates colder weather with local rains.
No. 1, with No. 5 above it, indicates fair weather, cold wave.
No. 2, with No. 5 above it, indicates wet weather, cold wave.

Explanation of Whistle Signals.

3. Note.—The warning signal, to attract attention, will be a long blast of from fifteen to twenty seconds' duration. After this warning signal has been sounded, long blasts (of from four to six seconds' duration) refer to weather, and short blasts (of from one to three seconds' duration) refer to temperature; those for weather will be sounded first.

Blasts.	Indicate.
One long	Fair weather.
Two long	Rain or snow.
Three long	Local rains.
One short	Lower temperature.
Two short	Higher temperature.
Three short	Cold wave.

Interpretation of Combination Blasts.

One long, alone.....Fair weather, stationary temperature.
Two long, alone.....Rain or snow, stationary temperature.
One long and one short.....Fair weather, lower temperature.
Two long and two short.....Rain or snow, higher temperature.
One long and three short.....Fair weather, cold wave.
Three long and two short.....Local rains, higher temperature.

(By repeating each combination a few times, with an interval of ten seconds between, possibilities of error in reading the forecasts will be avoided, such as may arise from variable winds, or failure to hear the warning signal.)

4. As the weather forecasts are telegraphed daily to a large number of stations of the Weather Bureau, to railroads, etc., in various sections of the country, there are many small towns which may obtain them by telephone, free of expense; they may also be obtained from the Associated Press dispatches published in daily newspapers. Those desiring to display or sound the signals, and who are not able to obtain the forecasts as above, should communicate direct with the Director of the State Weather Service, or with nearest observer, when, if practicable, the predictions will be telegraphed to them at the expense of the Weather Bureau; and if it is impracticable for the United States to bear the expense of transmission, they will be furnished at the regular commercial rates and sent "collect"; forecasts may also be obtained from any daily paper.

5. In no case will both A.M. and P.M. forecasts be sent to the same address at Government expense; nor will the telegrams be sent to more than one person, or firm, in any one place, except at the expense of the applicant.

6. Flag weather signals are displayed at many stations throughout the United States, and this improved system has been adopted with the view of securing uniformity, and is recommended after a careful test. The method is not complicated; the solid colors insure legibility, and the flags may be obtained at small expense, or, if desired, material may be procured, and the symbols be of home manufacture, no restriction being placed upon the size of the flags used, so long as they conform to the system above outlined, but no flags should be less than six feet square.

7. The system of whistle signals may be utilized to better advantage in many places where flags could not be seen at long distances, due notification having been given to the surrounding community through the press and otherwise that, at a designated hour, the steam whistle at a certain place will sound the signal to indicate the probable weather and temperature for the ensuing twenty-four hours.

8. The flag displays here outlined may be greatly extended and become one of the most valuable aids to farmers, shippers, and the public generally, by a little exertion and a small outlay for flags on the part of those who would be benefited. The system has been adopted and is in use by some of the principal railroads throughout the country, the symbols, made of tin or sheet iron, being displayed from the baggage cars. These roads transmit over their wires each morning, to points from which trains start, the names of the symbols to be displayed, the baggage-master at those points attaching them. When the symbols are displayed on the cars they

should be placed one above the other and read downward. Many large firms and corporations are exhibiting the flags, and at the same time advertising their business by printing the signals and their meanings on the back of their business cards.

9. There being but a limited appropriation at the disposition of the Chief of the Weather Bureau for the purchase of flags, it is necessary that the utmost care be used in their distribution in order that they may be placed in proper hands where they will be properly cared for as Government property and only used for the purpose for which they are intended. In many instances individuals, or firms, receiving the forecasts at Government expense manufacture or procure their own signals for such displays; those desiring to take such action in their individual cases may purchase the flags from any of the following firms at various prices, dependent upon the quality of the material used in their construction.

WASHINGTON, D. C., August 1, 1891.

"THE COLUMBUS OF PHOTOGRAPHY."

(DR. J. H. SCHULZE.)

The American Annual of Photography and Photographic Times Almanac.

∴ 1894 ∴

THE COLUMBUS OF PHOTOGRAPHY.

WHEN the great admiral, as Alexander von Humboldt has styled Christopher Columbus, landed upon Guanahani, a small island of the lesser Antilles, who could forsee the consequences of his discovery? Who could predict approximately the results to follow it, events of importance in Politics and Science, and who had a presentiment of the enormous and wide spreading revolutions to be consequently wrought in navigation and commercial matters so soon to ensue? The admiral named his newly discovered island "San Salvador," in commemoration of the world's spiritual saviour, and in devotion to Him, and although terrible sacrifice of human life through religious fanaticism, licentiousness of the conquerors, their cruelty to the innocent and trusting native inhabitants destroyed many millions of them, Columbus' discovery gave impetus to new life not only in this one land, but all over the globe. At first mere adventurers flocked to these shores, the politically and religiously prosecuted followed, but finally the husbandman, the tradesman, miner, the artisan and the scholar, selected this newly discovered country as a refuge, to enjoy life and happiness, not newly discovered only, but new from a geological point of view, for America is evidently the most recent elevation risen by plutonic force from an ocean bed.

The free institutions of our own and adjacent countries have

offered firesides and altars to millions of the oppressed, and Columbus's little "San Salvador" has forcast a safe asylum on this continent to all people.

Towards the end of the fifteenth and during the sixteenth and seventeenth centuries, at the time when Columbus, his followers, and other discoverers had found the much coveted precious metals to exist abundantly on the new continent, Europeans of studious disposition and greedy of gain, astrologists, magicians, monks, and physicians were much engaged in the search for the philosopher's stone or to prepare *gold* synthetically in their quiet and peaceful laboratories, the same *gold*, that across the ocean was acquired at the point of the sword, and with the loss of human life.

The words of a German poet:

> "Gedenkst du noch des schönen Amalgams
> Das aus Galmey und Kupfer wir gewonnen,"

pictures quite vividly the state of affairs of that time, in Germany at least, and how metallic compounds resembling gold in outward appearance were delusive enough to pass for the genuine. Fruitless as these erratic searches for gold had necessarily proved, they were of very important consequence in science and arts and in mechanical arts.

Our knowledge in chemistry and physics must be dated back to the alchemist, his observations have formed the foundation of correct conclusions, and the desire to make gold has resulted in some very important discoveries and inventions.

Columbus started out to find India by partly circumnavigating the world, and he discovered America. The alchemists wanted to make gold and found how to make gunpowder, porcelain, and many other very useful things. The outcome of alchemistic attempts is also photography.

The invention of photography is generally accredited to scientists such as Sir Humphrey Davy, Wedgewood, Talbot, Niepce, and also to Daguerre, who was after all a mere empiric, but it must be dated back to a much earlier period than the beginning of the nineteenth century.

The property of many substances to change their chemical constitution under the influence of light is the basis of all photographic action.

The first intimation of the property of a silver salt to turn black when organic matter is present, we find in "Compositum de Compositis," an essay by Albertus Magnus (1193–1280.

Fabricius, 1556, wrote about a silver ore, named horn silver

by him, but he knew nothing of its behavior when exposed to light.

When speaking of Fabricius' observations, Arago added incidentally: "*When exposed to light the color of horn silver turns from a yellowish gray to violet.*" Arago's remarks have been instrumental to accredit Fabricius with a discovery not at all due to him.

Fabricius himself had not observed the light sensitiveness of silver compounds. Glauber, in "Explicatis Miraculi Mundi," 1658, describes how aquafortis in which a little silver has been dissolved will turn hard wood the color of ebony.

But neither of these experimenters found photo-chemical action to be the cause of these phenomena.

Boyle, an Englishman, says distinctly in his "Experimentis et Considerationibus," 1660, that the blackening of horn silver and the purple stain produced upon finger nails or ivory by solutions of gold is due to the action of heat rays.*

As we see from the foregoing the reduction of silver and gold salts had hitherto been ascribed to the air, and mainly to heat rays, till the eighteenth century, when by quite curious experiments it was proved, light is the factor.

Johann Heinrich Schultze, born 1687, a medicinæ doctor at Halle, and later Professor of Medicine, and of the Greek and Arabic languages and a member of the Academia Caesarea Leopoldino-Carolina, was engaged in 1727 to make Baldwin's luminous stone (mainly consisting of calcium nitrite), for which purpose he neutralized chalk (calcium carbonate) with nitric acid and in an experimental way added nitrate of silver solution. He prepared the compound at an open window, illuminated by full sunlight, and to his great astonishment found the surface of the deposit to turn of a dark color, when light shone upon it, while the other side of the vessel containing it, that turned from the light remained white. When shaking up the jar, the color vanished and the mixture returned to a white. To make certain of his observation he cut designs, letters and figures in paper, pasted it upon the jar and exposed to light with the same result, letters and figures being visibly impressed upon a white ground.

Such and similar reactions having been ascribed previously to heat rays. Schultze exposed his chalk silver compound to a heat of 212 deg. F., and in total darkness, when no change of

*Dr. J. M. Eder, "Ausführliches Handbuch der Photographie," page 12-14. Wm. Knapp, Halle, A/S, Publishers, 1891.

color took place, which conclusively proved how light only had taken the active part in the experiments made. In his "Scotophorus pro Phosphoro Inventus seu Experimentum Curiosum de Effecta Radiorum Solarium," he stated further that when sunlight is thrown upon the chalk mixture by means of a condensing lens, darkening takes place more rapidly, and that a solution of silver nitrate in water exposed to light will gradually assume a dark color.

The portrait of Dr. Schultze is a reproduction from a photogravure illustrating the same book.

In Priestley's "History of Optics," the experiments of Schultze are mentioned without giving dates. Beccarius, of Turin, who came thirty years after Schultze, is said to have first observed the light-sensitiveness of chloride of silver, but as he evidently knew of Schultze's experiments, it would be folly to credit him with the discovery of the light sensitiveness of silver compounds, as has been done by many authors.

Dr. Eder, to whom the photographic world is largely indebted in many respects, is the most authentic historian. His careful and his laborious researches have assigned to Schultze the title of father of photography, no others can compete with him, and I, for my own part, feel proud a German occupies a position acknowledged now by almost all authorities.

Let us compare Schultze's chalk-silver mixture with Columbus's little "San Salvador." Chicago is now showing the wonderful attainments that have followed the discovery of America, and in the photographic department of the Fair we have been amazed at the consequences of Schultze's discovery of the action of light on chemical substances.

Charles Ehrmann.

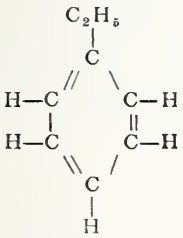
* Dr. J. M. Eder, "Ausführliches Handbuch der Photographie," page 16.

CONSTITUTION OF, AND RELATIONSHIP BETWEEN, ATOMIC STRUCTURE AND DEVELOPING POWER OF SOME AROMATIC COMPOUNDS.

Mr. H. D. Garrison, in The Annual for 1890, page 171, in an article on "The Wonderful Benzole Ring," indicates the principles upon which are founded the methods of graphically portraying the relationships of the atoms in the aromatic group of substances. Readers may refer to that article for a fuller comprehension of some points I may incidentally mention in this paper.

The compounds of the benzole or aromatic group are in great part built up by the substitution of one or more atoms or groups of atoms to one or more atoms of hydrogen (H) of the benzole; as an example, we may cite:

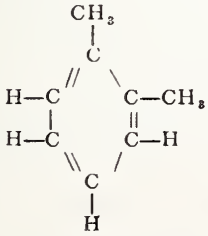
Ethyl Benzole.



In which one atom of H is replaced by the group C_2H_5. (C represents carbon.)

Or again, we may have:

Dimethyl Benzole.



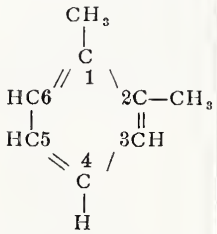
In which two atoms of H are replaced by two groups CH_3.

It will be noticed that the empirical formula of both these compounds is C_8H_{10}, in other words, they are isomeric; that

is, they contain the same kind and number of atoms, but differently arranged.

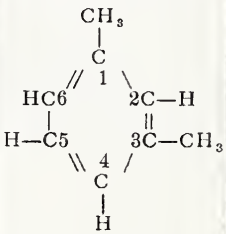
By a deeper study of dimethyl benzole it was found that three distinct compounds of this kind existed, proving still further isomerism. This is explained by the fact that the CH_3 may replace different H atoms in the benzole ring and thus new atomic relationships be established. The following formulas will give an idea of the explanations given for these isomerisms:

ORTHODIMETHYL BENZOLE.



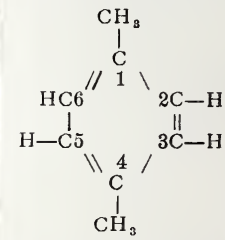
In which the groups CH_3 may occupy the positions 1.2 or 1.6—these being interequivalent.

METADIMETHYL BENZOLE.



In which the groups CH_3 may occupy the positions 1.3 or 1.5—those being interequivalent.

PARADIMETHYL BENZOLE.



In which the groups CH_3 occupy the position 1.4—only.

It will be noticed that the group which replaces the H is the same in every case, the difference being the position of the H atoms which are replaced. If the positions be at the angles 1.2, or what is identical 1.6, the compound is an orthoderivative of benzole. If the positions occupied by the substituted atom or group be 1.3 or 1.5, the compound is a metaderivative; while the compound in which the substituted groups occupy the positions 1.4, is a paraderivative.

We are now ready to give a brief account of the researches of the brothers Lumière, of Lyons, France, upon the effect which the position of the substituted group may have in endowing compounds with developing power.

From their researches the following deductions or general laws may be established:—

1*st Law.* In order that a substance of the aromatic group act as a developer, it seems necessary that two hydroxyl (OH) or two amidogen (NH_2) groups or one of each (one hydroxyl

and one amidogen) be present in the molecule. The graphic formulæ of the following developers clearly illustrate this law.

HYDROQUINONE.

```
        OH
         |
         C
       // 1 \
H—C6        2C—H
  |          ||
H—C5        3C—H
       \\ 4 /
         C
         |
        OH
```

or para dioxy benzole.

DIAMIDO BENZOLE.

```
        NH2
         |
         C
       // 1 \
H—C6        2C—H
  |          ||
H—C5        3C—H
       \\ 4 /
         C
         |
        NH2
```

or para diamido benzole.

PARAMIDO PHENOL.

```
        NH2
         |
         C
       // 1 \
H—C6        2C—H
  |          ||
H—C5        3C—H
       \\ 4 /
         C
         |
        OH
```

or amido oxy benzole.

2d Law. The paraderivatives containing OH or NH_2 or both, are the strongest developers, though some orthoderivatives possess the power to a lesser degree. The three examples given under the first law, *i. e.*, hydroquinone diamido benzole and paramido phenol all belong to the paraderivatives :—the OH and NH_2 groups occupying the positions 1.4. It is, however, also true that similar substances of the ortho series (position 1.2 or 1.6) also act as developers though not as powerfully as those of the para series.

As examples we have:

PYROCATECHIN.

```
        OH
         |
         C
       // 1 \
H—C6        2C—OH
  |          ||
H—C5        3C—H
       \\ 4 /
         C
         |
         H
```

or ortho dioxy benzole.

ORTHOAMIDO PHENOL.

```
        NH2
         |
         C
       // 1 \
H—C6        2C—OH
  |          ||
H—C5        3C—H
       \\ 4 /
         C
         |
         H
```

or ortho amido oxy benzole.

ORTHOPHENYLENDIAMINE.

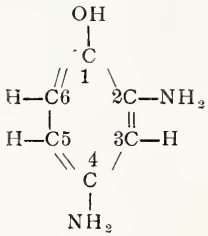
```
        NH2
         |
         C
       // 1 \
H—C6        2C—NH2
  |          ||
H—C5        3C—H
       \\ 4 /
         C
         |
         H
```

or ortho diamido benzole.

3d Law. The developing power may persist though the number of OH and NH_2 groups be greater than indicated in

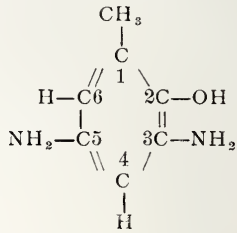
the first law. The well-known pyrogallol contains three OH groups, while among less known developers may be cited:

DIAMIDO PHENOL.



Positions 1.2.4.

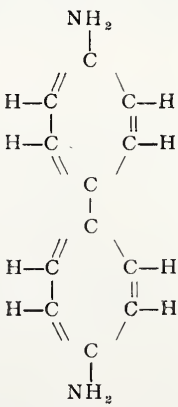
DIAMIDO CRESYLOL.



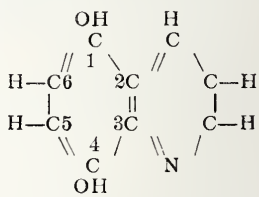
Positions 1.2.3.5.

4th Law. If the molecules be formed of two or more connected benzole rings or hexagons, the above rules or laws will only apply when the OH or NH_2 groups are present in the same benzole ring.

Examples:



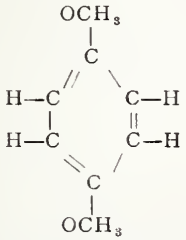
Benzidine or diamido diphenyl. Does not develop.



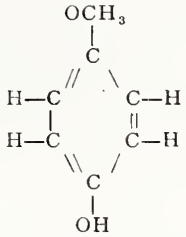
Para dioxy quinoline may be used as a developer.

5th Law. If substitutions occur in the OH or NH_2 groups,

the developing power will be lost unless two of these radicals or groups remain intact in the same ring.

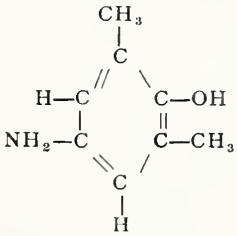


Dimethyl hydroquinone cannot be used as a developer.

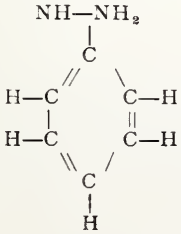


Methyl hydroquinone—though not a perfect illustration of law 5th, nevertheless seems to have the power of developing the latent image.

6th Law. Substitutions of the H of the benzole ring do not seem to affect the developing power to any extent—provided the proper number of OH and NH_2 groups be present. As an instance of this we have:—hydrophlorone



An exception to the above deductions or laws is found in phenyl hydrazine



which though a developer, cannot be looked upon as falling within any of the laws or rules set down in the foregoing paper.

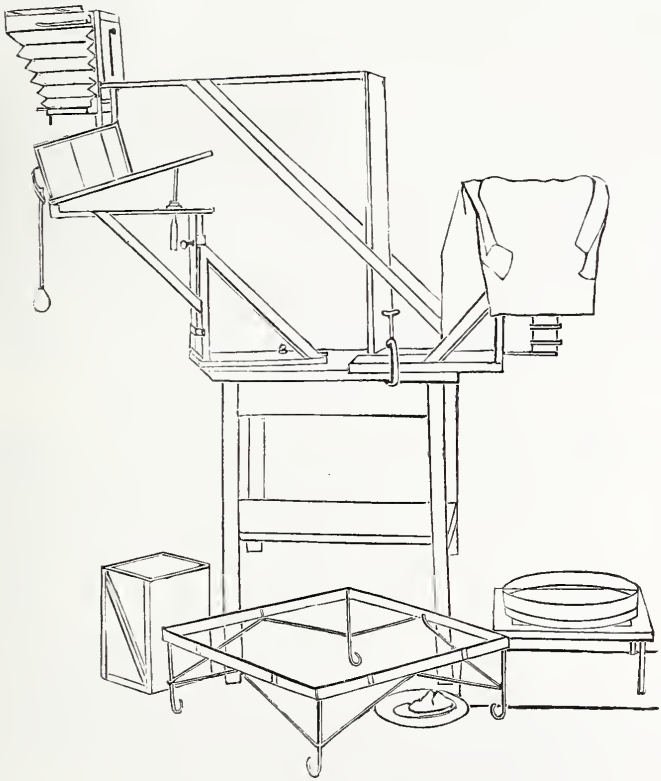
A. B. Aubert.

A CAMERA STAND TO MEET ANY REQUIREMENT.

In the Annual of last year, I took pleasure in presenting to the readers of your valuable publication, a description of the manner in which we photograph the specimens from the gynecological operating room of the Johns-Hopkins Hospital, and on receiving from you a few days ago, an invitation to prepare a contribution for the Annual of 1894, I could think of nothing which would interest those engaged in the same line of work more than a description of my stand, or camera support, in its entirety. I have devised this stand to meet the requirements of any conceivable position of the camera during the operations, for I have found it necessary at different times to place my camera in all the different degrees of a vertical and horizontal circle, and at varying distances from the floor. I claim no particular originality of the device, as it is so very simple that any one might arrange it as I have done, only that I will, by giving this description, illustrated by the following shown photograph, save them the trouble. The picture shows my whole arrangement, with the different attachments grouped around.

As will be seen, the main stand is a plain straight table, in size on the top 26x18 inches, and about 36 inches high; I have placed a shelf about midway between the top of the stand and the floor to which the different angles can be clamped; and also stored when not in use. With the part shown in the illustration on the left fastened to the table, the camera is held in its usual position, and can be elevated to a point by raising to its extreme adjustment the parts sliding on each other secured by the screw shown at the back; should a still greater height be required, the box seen on the floor can be clamped to the table by a cabinet-maker's clamp and the rest of the apparatus fastened to it, so as to reach a position of six feet from the floor, the camera can now be tilted to a great extent with the aid of the long wooden screw underneath the board supporting it. This screw is easily obtainable, by purchasing a wood screw clamp in any hardware store and wrecking it to suit your want. In photographing directly down upon the operating table, the attachment shown at the rear of the stand is used. It is best to secure this to the table by a large thumb screw on which the whole arrangement is rotated as a center, having an index or pointer on its base, and an arc drawn on the table; the camera can be exposed over a

given point on the operating table, and after exposure turned out of the way, first noting the point indicated on the arc, the plate-holder can now be reversed, the shutters set and the slide drawn, and when a second exposure is desired, the support is then revolved to the position occupied in the former exposure, indicated by the coincidence of the index on the figure on arc, as noted after first exposure.



On the right side of the stand is fastened the device already described in former article (page 188, ANNUAL 1893). This, with that here described, go to make up my whole camera support. I have here shown on the floor the dish in which specimens of a "cystic" nature can be floated in water, while those of a "fibroid" are placed on the stand having a plate-

glass top. For photographic work on the usually tiled floor of the operating room, any one who has ever tried it will experience the difficulty of using the conventional tripod. The camera cannot be put in any but a horizontal position without putting it in danger of sliding over at a critical moment. The generally employed gallery camera stand has few adjustments as compared with this, and is usually large and so occupies more than its share of valuable space.

A. S. Murray.

DOUBLES.

How To Make Them.

Fit an open square box into the back of the camera, having it fully as large, or a little larger, than the negatives you wish to make. My attachment is made for 8 x 10 plates and under, and fits into the back of a 10 x 12 camera. In shape it is like Fig. 1, and I will designate it as A. The box is about 3 inches deep. When put into the camera it appears as in Fig. 2. Now have a plain strip of wood just one-half the size of the opening in A like B, Fig. 3. Have B fit very nicely in A,

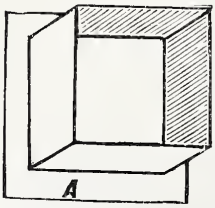


Fig. 1

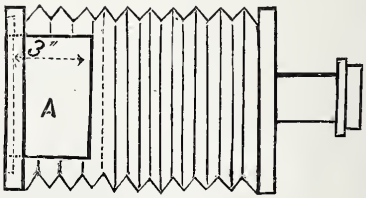


Fig. 2

Fig. 3

at the opening toward the lens, and so that it can be moved freely from one side to the other. It is very convenient to have a rabbet on the top and bottom of A so that B can be moved from side to side and maintained in any position.

To make a "Double," attach A to the camera as shown, put B into its place in the opening in A, say on the right-hand side as you stand back of your camera, thus covering up the right-hand side of the plate when exposure is made. Pose your subject on the left-hand side, which will give you an image on the right-hand side of your ground glass and plate,

W. J. Hickmott, Photo.

"GIVE ME THE CORE."

(See article on "Doubles.")

draw the slide and expose, immediately returning the slide. This finishes one-half of the operation. Shift B over to the left-hand side of A, which will cover up that portion of the plate just exposed, pose your subject again, but on the left-hand side, which will give you the image on the right-hand side of the ground glass and plate, draw the slide and expose out for the exact length of time as at first. On development, if the exposure on both sides has been correct, and of equal length, a perfect negative will be the result.

The camera must on no account be moved between the exposures, nor the focus changed. After making the first exposure the correct focus for the second is obtained by moving the subject backward or forward until an exact focus is secured, and not by moving the camera or ground glass. The whole apparatus should be painted a dead black.

When the attachment is in place it will be noted on the ground glass that while the strip B is just one-half the size of the opening in A, it does not cut off just one-half of the ground glass,a line drawn through the center of which showing that a space in the center of the plate about one-half an inch in width receiving a double exposure, but this is not apparent in the finished negative. The figure should be posed as near the centre of the plate as possible in each instance. This apparatus, as described, is only available for making two figures. By making B narrower, or one-third of the width of the opening in A, three figures may be made, using each time a separate piece to cover up that portion of the plate exposed, and by changing the form of B. to that shown in Fig. 4, four positions can be secured.

At the time I was fitting up my camera my assistant, (?) nearly four years of age, stood by watching the proceedings while endeavoring to get outside of a large apple, and making suggestions and asking more questions than I could answer had I given my whole time to the business. He wanted to know how, why and when I was going to make "funny things." So soon as I got the contrivance fixed I put him in position and tried the apparatus to see how it would work. I send you the result, to which I have given the very appropriate title "Give Me the Core."

Fig. 4

W. J. Hickmott.

BLUE PRINTS.

Not long since I had an opportunity to visit an exhibition of photographs by a flourishing amateur club. The walls of three or four rooms were adorned with pictures, most of them of average merit, some of them of a high order of merit which would have been creditable anywhere. There were many suggestions in selection of views, in arrangement of subjects, in graceful and happy posings, and in the more mechanical processes of printing and toning.

There was plenty of food for thought. I wondered how a certain very rich and warm tone was produced on some silver prints; how a wonderful delicacy and refinement of color was gotten on some aristo heads; how some bromide enlargements were printed so clean and sharp; and appreciating the display of artistic skill possessed by people capable of doing such work, I wondered still more why they permitted a youth to hang on the walls, several hundred blue prints, not one of which possessed as an object for exhibition a single merit.

They were made on poor paper from spoiled negatives, flat, wishy washy under-developed, over-exposed, everything bad which could happen to paper and plates, and yet they were held up to view as part and parcel of an otherwise creditable exhibit.

As long as any printing process is treated in this way it is bound to be in disrepute, but I will venture the assertion that had the members of the club taken their best negatives, used the freshest and cleanest paper and had made prints of the same quality as their best efforts in silver or bromide; their blue prints would have averaged in no way inferior to the best results of the other processes.

This will doubtless surprise many and will be thought to be overstated. But the facts will bear me out.

Many people dislike the blue color. That is a matter of taste. All printing processes, and all colors are distasteful to somebody, nevertheless every color is suitable to some particular subject, and no one negative will make equally good prints in blue, silver, aristo, bromide or what not. When the right subject, and the right printing process, and the right color, and the right negative are brought together, the result is so evidently in harmony that a fair-minded, cultivated and intelligent taste cannot fail of enjoyment.

For subjects involving skies full of soft, billowy, cumulous clouds, a blue print is charming. So it is for water-scapes,

wood interiors, running brooks and the like; for flowers, for bird's-eye views including distant hills; for such subjects the blue color is no serious objection, but there are blues and blues, one is of cerulean origin and the other hadean. See to it that your selection is from above and not below.

To get the right color do not overlook the statement often made by the skilful printer, that "you get your tone when you make your negative." The proper negative is clear and clean, free from fog or veiling, full of detail in the shadows, but just a little thin as to density. From such a negative a blue print may be made second to no process except aristo for detail and brilliancy, and as beautiful in color as sea water in mid ocean, clear from a suspicion of purple, green or gray.

I am not sure, but I think a developer of mixed hydroquinone and eikonogen makes the kind of deposit which produces the finest color on blue paper. Some negatives will develop a green tint on any paper placed under them, and I have been unable to determine the cause. I think also that glass negatives are better than celluloid films—or at least the kind with mat backs which seem to have a yellow tinge—but given the right kind of a negative and a good blue print can be produced from either.

As to the preparation of the paper it is almost as simple as making the print, but I am reluctantly forced to admit that I have never been able to produce so good an article as the best I can buy in the market. There is no end of poor stuff for sale, but there are two or three dealers who make and sell a thoroughly reliable article. Probably there are many such, but I have not found them.

Any good writing paper, for instance, is suitable for coating, but the best paper is the Rives or Steinbach photographic, which needs a slight additional sizing to keep the solutions on the surface. A few grains of starch or gelatine to the ounce of water lightly brushed over the paper and afterwards dried is sufficient.

The sensitizing solutions recommended are as varied in their composition as the dry-plate developer, but like the developer the simplest formula is the best, and the additions are largely inert or of doubtful efficacy.

Make two solutions, one of from 50 to 100 grains of red prussiate of potash to the ounce of water, and the other of 50 to 100 grains of ammonio-citrate of iron to the ounce of water. Make the solutions of about equal strength, mix equal quantities of each, and with a broad, flat, camel's-hair brush,

or a soft sponge, or by floating, coat the paper, laying on the wash flat, even and lightly, as a painter covers a board. The mixed solution being of course sensitive to light this operation must be performed in the dark-room or at night by a moderate light. The solutions do not keep well, and no more should be prepared than is required for immediate use.

It is essential to good results that the sensitized paper should dry quickly, and means should be taken to secure this result. Hang before a register, or near the fire, or over a lamp. If the weather is damp and the paper is some hours drying it is sure to spoil. After the paper is prepared it must be kept dry and in the dark. Perhaps as good a way as any is to cut it in sheets and place between the leaves of a book under a weight. If wrapped in oil paper or similarly protected so much the better. The prepared paper will not keep over thirty to sixty days at the outside.

When fresh it presents a brassy yellow color, gradually turning gray. It is in its best condition for printing when from one to two weeks old, and later on, deteriorates rapidly. A week of rainy weather is apt to spoil it however protected.

After exposure under the negative wash in running water or several changes till the wash water ceases to be tinged with the absorbed color.

I think I have tried almost every agent suggested for changing or improving the color of the blue print and have made many experiments. All the alkalis will bleach the prints, to destruction if subjected long enough, and dilute acids will clear the prints and somewhat improve the color. A good plan is to keep on hand a few ounces of a weak solution of hydrochloric acid, and after washing the print thoroughly, pour over it the weak acid for a moment or two. Return the acid to the bottle and wash again in water for two or three minutes. When the acid solution gets discolored throw it away.

So far as my experience goes none of the proposed toning baths are satisfactory; they simply destroy a beautiful clean color and substitute for it one more or less dingy and muddy.

If the paper is good and fresh an over-exposed proof may be treated with boiling water and the acid bath with good results, but like a negative which has had just the right exposure, no doctored print is ever equal to the one which is correctly timed.

Many and various are the reasons which influence individuals to dabble with photography, but to those who, like Mr.

H. P. Robinson, are "after a picture," as the result of their labors, the blue print has this to recommend it; it is the product of the simplest process known, it is absolutely permanent, and it is almost equal to the very best for detail and sharpness; and allow me to venture the prediction that if the reader will carefully study the next first-rate blue print he may chance to see, he will be surprised at its beauty and meritorious qualities and he may perhaps feel a desire to go and do likewise.

George A. Sawyer. U. S. N.

HIGH RELIEF PLATES DIRECT IN HALF-TONE.

Only a few years ago I published a method of how to make etchings, decorative designs and pictures upon glass by photomechanical means.*

Since then, and in the pursuit of further experiments, I have found that after the principles there explained, but modified to a great extent, etchings upon metallic plates may be prepared perfectly suitable for high relief as well as for intaglio printing, in either way the plates showing a grain answering well all technical purposes.

The difference between the two methods, the high relief and the intaglio, is simply that for an intaglio or photogravure plate the transfer made upon the copper-plate must be of positive character, while for high relief printing the transfer is from a negative. For type printing the plate must have a coarser grain (Korn).

It is not at all necessary to speak here of the enormous improvements and accomplishments in photomechanical printing lately recorded, or to mention the great bearing of photographic illustrations in books and journals, and the daily press, upon the general education of the people at large and upon the spirit of the times. But no matter how considered, the apex of this comparatively new industry can by no means be reached as long as we are compelled to dissect the photographic image into lines, simply paralleled or cross hatched, or in stipple, before etching and printing.

Perfection or accurate reproduction of all the details of the original half-tone photograph can be expected only when the

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* *Photographic Times*, vol. xx., page 340; *Zeitschrift für angewandte Chemie*, 1890, page 451, and American Annual of Photography, 1892, page 140.

negative is directly and without intermediate means reproduced upon the printing-block.

The conditions to attain to satisfactory results are various. The sensitive film covering the metallic plate must necessarily be furnished with a grain corresponding to every tone gradation, and after being developed must be so retained that in the subsequent etching not the slightest details are destroyed, or in better words, perhaps, the sensitive film must, after developing and after etching, be perfectly intact throughout its entire surface.

The film should be permeated with the etching fluid, but should not be acted upon chemically, else the grain is in danger to be destroyed.

For practical high relief printing, a decidedly strong grain and deep etching is one absolute necessity, still must provision be made to modify the grain according to the depth of tone of the original. Is it desired to reproduce very fine details, we must be enabled to prepare the light sensitive grain film in such a manner that the grain is of almost microscopical fineness, and absolutely sharp. For less detailed effects the grain may be coarser.

Let it be well understood the grain we speak about is not one artificially produced, but the result of chemical action, and therein alone lays the difficulty to solve the problem before us. When writing about etching on glass with hydrofluoric acid I have advanced the idea that perfect success is attainable only when the film consists of at least two different strata, first, the one of actual light sensitiveness, changed by light in its solubility property, and of the other, insoluble in the developer, into which, as it were, the superstratum is imbedded. A light ray striking such superstratum changes at once the chemical constitution of all particles of that portion of the film, while all the other parts remain intact or soluble.

If, then, a plate of this kind is subjected to development, the action will not be upon the exposed but the non-exposed parts, the light sensitive substance will be dissolved, leaving the substratum in a sort of grainy condition.

Through this grain-film or skeleton acids may pass and to act as etchers upon the metallic surface.

When such a film is exposed to light under a negative, it passes the usual process. Wherever sun rays have acted through the darkest portions of the negatives, but very few particles of the light sensitive body have been transformed into the insoluble state, in consequence whereof more numer-

ous pores and minute openings will occur, through which the etching acid will pass easily.

The behavior of the lighter parts of the negative offers more serious difficulties. According to the intensity of the light, more or less particles of the light sensitive substratum will become insoluble, and the superstratum will show proportionally but few or no pores.

The etching acid may pass through these openings slightly or not at all.

Deducing from the foregoing, it may be readily understood that by modifying the relative proportions of light-sensitive body and substratum, we are able to produce any suitable grain for finest photogravure plates as well as for high reliefs.

The accompanying zinc clichés will show how nearly I have reached the goal. The method is extremely simple, although the time of exposure varies in direct sunlight from twenty to thirty minutes.

Presumably the method is well adapted for heliochromic printing, as the much disturbing interfering of light phenomena always consequent to overlaying colors, as, for example, with all Meissenbach or high relief work, is not to be feared in this instance.

If a copper or zinc plate furnished with my new film is exposed to light, thoroughly developed, but not etched, is then immersed into a weak solution of mercuric chloride, the mercury will diffuse through all the pores of the film and amalgamate with the metallic particles found present.

After careful washing, prints can be pulled off a lithographic press from such plates, similarly to Lichtdruck printing, and coarser or more detailed effects be obtained according to the quality of the film employed.

For photolithographic purposes it is best to use transfers from copper or zinc plates. The ponderous lithographic etched stones are not easily managed, and it is difficult to supply them with an uniform coating.

On account of the possibility of modifying or controlling the fineness of the grain the method is well adapted for color printing on the lithographic press.

Dr. Armand Müller Jacobs.

PHOTOGRAPHY IN THE NAVY.

THE camera is capable of playing an important part in naval operations, both in peace and war. Although it has not yet found a permanent place in the official equipment, many of the new cruisers are generously fitted out with photographic apparatus, and not a little good work has been done by naval officers in the coast survey and the various Arctic expeditions of recent years.

On the new ships the facilities for photography as a rule, are very good. A store-room below the water line makes an ideal dark-room, for it is well ventilated by the ship's blowers and light is supplied by a ruby incandescent lamp, shaded by orange paper. A shelf or two secured to the bulkhead for chemicals, trays, etc., an old-fashioned powder tank fitted with a faucet for a reservoir, and a couple of deck buckets will complete the furniture of the room, while the ocean itself is at hand in which to wash the negatives, it being only necessary to give the plates a final bath and soaking in fresh water to remove the salt crystals.

It is rarely convenient on board ship to carry photography beyond the limits of blue printing or bromide work. Silver printing is best done ashore, and now-a-days there are few ports of any size which do not boast of a Camera Club to which access is not difficult.

At sea, there are always a multitude of picturesque subjects, such as scenes around the "peopled deck," bits of masts and sails with the sea for a back-ground, evolutions of other ships in the squadron, etc., while sometimes there are opportunities of catching a water-spout, or the breaking crest of a storm wave. In port, or while coasting, the camera may be made more useful in photographing headlands and in surveying. Surveying, however, requires special instruments such as Moissard's cylindograph, which gives horizontal angles directly from the picture, and a camera in which the plates are exposed horizontally for panoramic views.

Photography has long been in use in connection with captive military balloons, and it has been successfully tried in connection with the carrier pigeon service. Judging from experiments abroad with the balloon on men-of-war, and from recent experience in our own fleet with homing pigeons, both the balloon and the pigeon will have a part to play in the next naval war, and hence an extension of photography may be looked for afloat. During the siege of Paris, M. Dagron, the

inventor of micro-photography claims to have actually sent by carrier pigeons over two million and a half photographic dispatches. These messages were photographed upon a pellicle of extreme lightness, placed in a quill and attached by a waxed thread to a tail feather of the bird. When received, the pellicle was unrolled by means of a little water containing a few drops of aqua ammonia and read with a magnifying glass. Eighteen copies, or 5,000 messages, only weighed 1.28 ounces, and could be put on a single bird.

A curious application of photography to gunnery was made a few years ago by a German scientist, who placed a sensitive plate in the interior of a shell and so arranged it that when the gun was fired and the shell hurled rotating through the air, a point of light which was allowed to impinge upon the plate from a minute hole in the nose of the shell described a spiral upon the plate, from a mathematical calculation of which many interesting facts were ascertained.

Albert Gleaves, U. S. N.

SUGGESTIONS IN PRINTING.

The ready-prepared papers are so numerous that a great many amateurs have abandoned silvering albumen paper for the easier method of using the manufactured article. Although, as stated, there are many kinds of printing paper manufactured, I have yet to find one which will equal freshly prepared albumen paper. To those who use but a sheet at a time or less, it is certainly more convenient to purchase ready-prepared paper cut to size; but those who use more than a sheet at a time, I would advise the continued use of albumen paper, freshly silvered, as being productive of the best results.

Much has been written on the subject of preparing the paper, toning and fixing. I shall not go over this ground again, but in the following few lines endeavor to offer a suggestion or two that may help some struggling brother along the rugged path.

The bath I use is the so-called nitrate ammonium bath, in which the ammonia is added to the silver bath, thus obviating the necessity of fuming and saving the space occupied by the fuming box. This bath is simply made and can be strengthened as required. It has been learned by experiment that each sheet of paper silvered reduces the strength of the bath

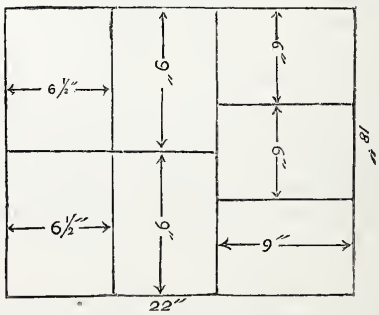
by $43\frac{1}{3}$ grains of nitrate of silver, and hence the bath should be strengthened in that proportion after use. To avoid what is known as tear-drops in drying, many blot the paper. This is a good method, provided the blotting paper be free from all traces of hypo, but a surer way to obviate the difficulty is to go carefully over the paper, before floating, with a tuft of cotton, which will remove all greasiness. The paper will then dry smoothly and without the defect mentioned.

In lifting the paper from the bath, it should be lifted by one corner first, and slowly and steadily raised from the solution. The solution will drain from the paper into the bath and the paper will not drip when hung up.

For drying purposes, two cords should be stretched across the room, one above the other, a distance apart equal to the length of the paper. By clamping the four corners of the latter to the cords referred to the paper will dry comparatively flat.

When dry the paper should be folded to the proper size and cut with a lever cutter, such as is used for cutting ferrotype plates. This will save much handling and will keep the surface of the paper from being injured, as it is quite apt to be under ordinary scissors manipulation.

The paper should be cut at least one-quarter of an inch less in size all round than the negative, as the frame covers at least that much. For a $6\frac{1}{2}$ x $8\frac{1}{2}$ negative the paper should not be larger than 6 x 8. This avoids waste both in trimming and toning. By careful division 7 pieces of paper



sufficient in size for a $6\frac{1}{2}$ x $8\frac{1}{2}$ negative can be obtained from an ordinary sheet, leaving the raw edge for trimming. By the ordinary method of folding only 6 pieces are obtained, all of which afterward require trimming.

The simplest bath for toning is a quart of warm water, to which has been added a tablespoonful of salt, half a teaspoonful of bicarbonate soda, and 2 ounces of gold solution (15 grains chloride gold to 15 ounces water). Use a grain of gold to each sheet of paper toned. When through toning, pour the bath into a bottle to be kept for this purpose, afterward adding a small piece of ferric sulphate. This will precipitate the gold, after which the clear solution may be poured off. When a sufficient number of baths have been precipitated to make it an object, the precipitates may be collected and placed in the hands of the refiner, who will return the gold in the original form of chloride if desired.

Any trimming necessary should be done before toning, as both time and gold will be saved, and, if desired, the prints can then be mounted immediately after fixing and washing.

If possible, always use paper that has been freshly prepared, and do not silver more than is required for the day's work, as it does not keep well.

With freshly prepared paper, negatives of ordinary density, and ten frames exposed to good sunlight, fifteen sheets of paper, 18 x 22, can be printed in three or three and a half hours.

Robert E. M. Bain.

PLENER'S METHOD FOR RAPID EMULSIONS.

In order to obtain high sensitiveness by the ammonio-nitrate of silver process, two methods are employed. Increasing of the temperature during the mixture of the solutions at a tolerably high temperature for a short time or a prolongation of digestion at a lower temperature for a comparatively much longer time. Plener's method differs quite materially from those usually employed, in that he uses no heat in mixing the solutions, but on the contrary reduces the temperature almost to the setting point of the gelatine. The formula is given strictly according to the original in grammes and cubic centimeters.

Solution No. 1.

Nitrate of silver	50 grammes
Water	250 cc.m.

dissolve and add ammonia until the precipitate is dissolved.

SOLUTION No. 2.

Ammonium bromide	40 grammes
Water	200 cc. m.
Iodide of potassium	1 to 1½ grammes

SOLUTION No. 3.

Hard gelatine (simeons), soaked in water for two hours and the superfluous water drained off and gently heated in a water bath until melted	40 grammes

SOLUTION No. 4.

Coignet gelatine (gold medal), in water sufficient to soak and swell the gelatine, the superfluous water is drained off, and just before using 25 cc. of ammonia is added	25 grammes

In order to prepare the emulsion a high and narrow bottle is required so that, in shaking, the foam will rise nearly to the top of the bottle. Solution No. 2 is first placed in the flask without warming; to this is added one-sixth of the solution No. 3 and vigorously shaken so as to form an abundant foam which should entirely fill the bottle. The colder the solution the less gelatine will be required to form an abundant foam, but the temperature must not fall below the setting point of the gelatine, and herein lies one of the difficulties of following out the formula, which can only be obviated by a very careful observation of the exact temperature at which the gelatine begins to solidify and keeping just above this point.

We next add the silver solution also cold, in a thin, fine stream by means of a capillary tube or an atomizer, still continuing the vigorous shaking and it will be observed that the mixture is gradually becoming very thick and nearly approaching the setting point. Immediately after the addition of the silver solution the bottle is placed for a few minutes only in water at 35 degs. C., and then the remainder of solution No. 3 is added, which has also been heated by the water bath at 35 degs. C. to 40 degs. C. The whole is kept in the water bath at 35 degs. C. to 45 degs. C., and frequently shaken for one-half hour. Solution No. 4 is now added, and the whole digested one quarter of an hour at the same temperature. It is now poured out in a dish of such size and dimension that the resulting layer of emulsion shall not exceed 3 centimeters in thickness, and allowed to set, during which time the dish is covered with card-board to prevent the too rapid escape of the ammonia.

As soon as the emulsion is solidified the card-board cover is removed and the emulsion is left in the dark chamber to ripen

from one to several days. Small quantities are taken from day to day and tested for sensitiveness and when the desired degree is reached the emulsion is washed as usual. The most favorable temperature for ripening is 10 to 15 degs. C. An emulsion prepared in this manner has a tolerably high sensitiveness after digestion, which by a sort of crystallization in the cold is increased in a remarkable degree. By very long standing before washing an enormous sensitiveness can be obtained, but in such cases the gelatine becomes as hard as horn, and the sensitiveness is far greater when the plate is exposed before it has dried.

The characteristic features of this process are, 1st, the colder the solutions during the mixture the less foggy will be the emulsion; 2d, the colder the mixing temperature the less danger from the formation of fog during digestion, far less than when prepared in the ordinary manner by warming the solutions before mixing; 3d, the silver bromide prepared thus by cold solutions just above the point of solidification of the gelatine is particularly susceptible to ripening into enormous sensitiveness by the process of standing in thin layers at the low temperature of 10 degs. C. 4th, the process is difficult and very disappointing until sufficient experience is obtained to guard against the setting of the gelatine during the mixture of the solutions.

R. E. Van Gieson, M.D.

THE TIMING OF EXPOSURES.

The best device for timing exposures in the field that I have seen published is the pendulum arrangement which vibrates once every second, and is no doubt excellent for exposure of one second and longer.

But as is often the case when using rapid plates the exposure is very short, even with the smallest stop, and such an arrangement is hardly practicable as it is necessary oftentimes to expose for only a fractional part of a second.

To be successful one must be accurate.

My method is very simple and with a little practice is sufficiently accurate for all practical purpose. A shutter actuated by bulb pressure is of decided advantage, and my supposition is that you possess one.

The only requisite is a watch.

Find out how many times it ticks in one second. My watch

ticks 300 times in one minute or five in one second, which is about as fast as one can count comfortably.

I proceed in this manner. When everything is in readiness I place the watch to my ear and I can hear the time marked off for me in one-fifth seconds. If you squeeze the bulb at the instant you commence to count you will loose the first interval one-fifth of a second. Instead of opening the shutter as soon as I commence to count I make a practice of always counting five counts, squeezing the bulb at the instant of the fifth count, then commencing again at one I hold the shutter open while counting the required number, releasing the pressure on the bulb at the instant of the last count.

I do this to accustom myself to the speed of the watch, but more particularly to have a regular starting point, and thus insure a complete exposure.

A. T. Tweedie.

CHALK PLATE ENGRAVING FOR PHOTOGRAPHERS.

THE object of this article is not to discuss the question of the comparative merits of the photo-zinc and chalk plate process for the cheap and quick production of newspaper "cuts." Under certain conditions zinc has undoubted advantage over the chalk stereotype, while for other work under other conditions, the chalk process stands without a rival. Both are good and each has its own sphere of usefulness in which it can be worked without coming into collision with the other.

The chalk engraving process may be described as follows. A perfectly flat and smooth plate of steel $\frac{1}{16}$th of an inch thick, is coated to about the same thickness with a chalky composition that can be readily scratched away with a sharp pointed instrument. The design to be produced is traced through the chalk coating by the little graver (Fig. 1).

The dark steel is uncovered by each stroke of the tool, and shows up in fine contrast with the pure white of the chalk, giving the workman an exact idea of how the picture will look when printed with black ink on white paper.

When the drawing, or mould, as it really is, is completed, the plate is put into a stereotyping box, the whole thing heated somewhat hotter than for casting from ordinary paper matrix, and an impression in type metal taken. Where the chalk has been scratched away, the hot metal runs down to the level of the steel plate, while over the rest of the surface it is kept back

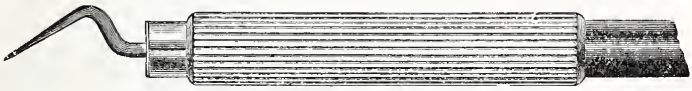


Fig. 1

by the thickness of the layer of chalk, and thus a printable metallic relief is obtained. After cooling, the stereotype is removed from the box, mounted type high, and is ready for the press. If no accident happens to the chalk plate, an indefinate number of stereotypes can be taken from it; the one here given of the Brownies on the mule being printed from the tenth cast.

The secret of chalk plate manufacture is to get a chalk composition that can be scratched through, leaving clear cut, well defined lines, that will not break away from the steel base in chunks during the engraving, or crack or crumble during the final heating. To the late J. W. Hoke, of St. Louis, is credited the invention of the plate now in general use. He had worked for years in overcoming the above mentioned difficulties, and in 1885 completed his invention. The first practical use made of it was on the day when the body of the murdered Arthur Preller was found in a trunk in a St. Louis hotel.

The discovery was made about noon and at 1.30 P.M., one of the city dailies had an "extra" on the street, containing a full account of the horror, illustrated by a well executed "cut" of the trunk and its ghastly contents, that had been found but ninety minutes before. The process by which this picture was so quickly produced, was Mr. Hoke's new invention, and newspapers everywhere, seeing in it possibilities for cheap and rapid illustration never before dreamed of, began to take it up, till now nearly all the great city dailies supplement their reading matter by chalk illustrations.

A comparison of the files of our leading papers of current issue, with those of ten years ago, will show the great change that chalk engraving has made in pictorial journalism.

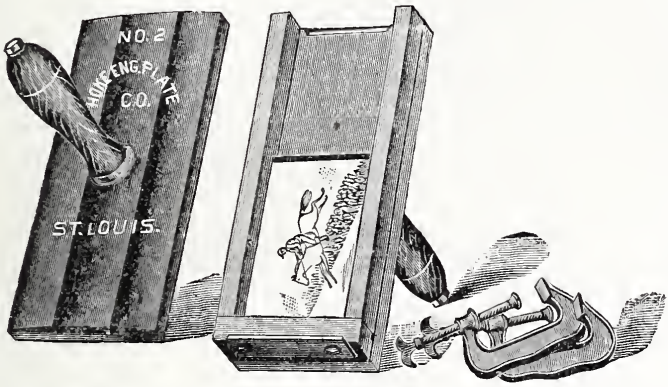
But what has all this to do with the photographer? If he

is handy with his pencil, can draw and sketch with ease, and has a spare moment now and then, there is certainly something in chalk engraving for him. In the first place he has an ever-ready method of producing novel and attractive advertisements for his own business. Who does not read an advertisement that is accompanied by a comic picture? The accompanying libel on the *Facies Humanus* is almost homely enough to stop a printing press, but it will be remembered that it served its day and generation in successfully advertising N. Y. aristo paper in the magazines a few months ago. The three Brownies on a mule, adapted from Palmer Cox, are given as an example of a style of chalk cut "ads" that are sure to attract attention. But it is in local newspaper illustration that the average photographer will find the biggest field for chalk engraving.

A HEAD.

A prominent citizen dies suddenly, you have a negative of him, from which you quickly make a bromide print the size required. You next lay it on the chalk surface and trace over the outlines, so as to impress the chalk slightly. You then remove the pattern and finish the sketch free handed. The casting and mounting take but a short time, and the portrait is ready for the evening paper. Many different uses for the process will, of course, suggest themselves to the enterprising photographer.

Where can these plates be obtained? What outfit is required to work them? and what is the cost? The plates are made by the Hoke Eng. Plate Co., of St. Louis, Mo., and are sold in dozens like photo dry plates. Plates 3½ x 5, which cost $6.50 per dozen, will be found to be the best for begin-



ners. They can be engraved with any pointed instrument, but the little tool (Fig. 1), which costs 50 cents, is the best thing for the purpose.

Almost every country printing office has a stereotyping apparatus of some kind that can be pressed into service for making casts, but if this cannot be had the Hoke Company furnishes the stereotyping box here shown with complete outfit for trimming and mounting for $14.50; or if you wish you can send the engraved plates back to the makers, who will make the casts for you at a small cost.

Chalk plate cutting cannot but prove a pleasant and profitable occupation for spare moments to any who may engage in it.

J. Will Barbour.

ARTISTS AS PHOTOGRAPHIC JUDGES.

THE photographic public is greatly to be congratulated upon the gradual decrease of the old spirit of animosity between the two parties whose watchwords were "artistic effect" and "good chemical effect."

I can well understand that a novice in the art would imagine the two named qualities to be rigidly incompatible, if he believed or attempted to put into practice what different writers of opposing schools teach upon the subject. My own view of the matter is that it is as senseless to couple the terms "artistic effect" and "chemical manipulation" as it is to gabble about the "conflict between science and religion." Just as if there were either any intimate organic connection, or any enmity between them.

I am very glad to see that it is increasingly the practice to put men as judges on photographic exhibition boards who are conversant with the practical parts of the arts of drawing and painting. They are balanced, as a rule, with enough skilled photographers to prevent those among the artists who may not understand photography from coming to rash conclusions and giving judgment accordingly. I mean by this to say that artists frequently admire some gross photographic defect, saying that if it be a defect photographically they would nevertheless like to see more such. I am glad, however, to be able to say that photographic defects are not always reproducible at will. Mr. Ruskin says of children who are learning to draw, that the danger is *they will learn to like the wrong things* unless carefully instructed, and their taste and style gradually formed and developed, and restrained if seen going in a wrong direction.

I do not hesitate to apply these wise words of a great man to artists sitting as photographic judges, if they are either quite devoid of knowledge in practical photography or very slightly informed about it. The danger is that like the children, they will prefer the wrong things, or in other words mistake photographic botch-work for artistic excellence. I am not sure that an opinion given by a good photographer upon the artistic merits of a painting would not often be better than that of an artist upon a photograph. And this not so much because the painters are apt to pass over and neglect the good points, as they are to admire what is unphotographic, unworkmanlike, and wrong.

Ellerslie Wallace.

PHOTOGRAPHY AND FLOWERS.

Those who use the camera will find that camera practice has many offshoots, and that they are led on from one graceful class of thoughts and things to others similarly interesting.

Last Thanksgiving Day, in a certain house, a part of the ornament of the dinner table was a vase of fresh cut flowers. There was nothing remarkable about this; but it was so pleasing that the owners would not willingly let it die. It must be preserved. Instantly the photographic method of doing so came into the mind, and the stereoscopic box as the best means of securing the end. It was done, and the Thanksgiving flower is still admired, and will be for many days to come.

But what of it? Most people like to look at a vase of flowers. It is their suggestions, however,—their hints to the imagination that give much of their meaning to the flowers. As a rule, these cease with the decay of the leaves, while, on the other hand, if properly treated, they will live as long as does the interest of an amateur in the work of his own hands. The stereograph, then, of that Thanksgiving bouquet has bred a multitude of thoughts—such thoughts as a bought picture of similar objects could never have brought about. How the petals of the rose are arranged! How differently the carnation! Why is it that the artist who prepares decorative work for fine ware or for wall ornamentation sketches "single" flowers, and rarely the richer "double" beauties? And why can't I cultivate such flowers for myself next year, and enjoy them as they come on through leaf and bud, as well as in blossom? Well, to pass over many intermediate steps, full of pleasure, the present moment finds the stereoscopist of last November in possession of beds of actual and prospective blossoms more interesting and fair than the greenhouse bunch that still blooms on its glass slide. Thanks to photography for this new interest in the world of natural beauty! The same result *might* have been brought about in other ways, perhaps, but the repeating and perpetuating power of the camera gives a means of awakening the mind that nothing can equal.

What next? In floriculture every day brings up some fresh fact of æsthetic or scientific interest. These can be transferred to the film and a record formed more lifelike than the herbarium with its dried specimens can offer.

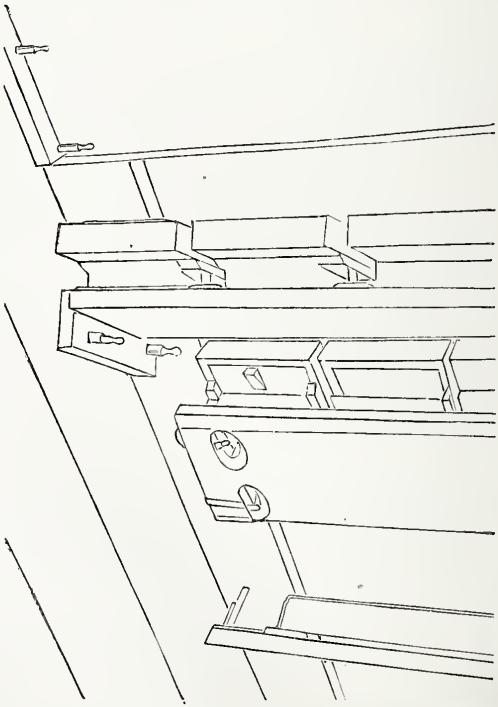
If any reader has not tried the twin lens camera for the above purpose, he has a revelation yet before him of what photography can do. Plain pictures of the objects referred to are

good, of course, but the professional educator like myself, whose end is *instruction*, will find that information is much more readily and lastingly conveyed through the solid-looking object seen in the stereoscope.

George Kennedy.

A PRINTING WINDOW.

A DEMONSTRATOR doing some printing in one of my windows thought I ought to describe it in some of our journals, on account of its convenient arrangement of frame supports, and



certainly THE ANNUAL is the medium *par excellence* through which it can reach a host of printers. The many good things which we get from THE ANNUAL should stimulate us to give

our very best. (Let the good work go on—multiply and still increase.)

My printing windows are made of ground glass, 30 x 48 inches, set on about 45 deg. pitch. But it is the arrangement of frame supports that I wish to describe, consisting of a series of shelves. One corner of window is shown in the engraving, and you will notice that the shelves are simply hung on a swivel bolt at the lower edge of each end of the shelf, and another bolt in the upper edge holds the shelf in position, turned up to face the light or back to be filled with frames. Use a common window-spring bolt, three for each shelf. The manner of applying the bolt is plainly shown by the engraving. Two methods are shown, but I prefer the one depicted on the upper shelf.

The window shown is arranged for 5 x 7s, and the shelves are 8 inches wide, set 10 inches apart, but larger frames can be used by removing every second shelf, which can be done in half a minute. The shelves should be about $\frac{3}{16}$ inch shorter than the space for them, and a washer put on the sash-bolts, to prevent rubbing and dust making.

In the engraving the lower shelf is turned down to be filled with frames, the second one is turned up to the light, and the third one is turned down for convenient handling of the frames while examining the printing.

The advantages are the large number of frames set in small space, the convenience of handling the frames, and the ease and certainty with which they are put in good position to the light.

The time occupied in looking over the prints upon a single shelf is so small that no irregularity of light can occur from turning the shelf down. I tack a strip of tin on the wall for the end of the spring-bolt to rub against, so as to prevent wear and dust.

C. R. Arnold.

HOW TO SUCCEED.

"HASTE makes waste," is an old, but none the less true saying, and to none is it more apparent than to those who have indulged in the art of photography. There are so many points of detail in taking and finishing a picture which require but a trifling amount of carelessness or lack of judgment to spoil everything, that innumerable opportunities are afforded for waste of material. The beginner who starts at the middle or upper part of the art will find that he has added largely to his waste account, and his interest will wane in proportion. His inordinate desire to undertake the more difficult processes of photography at first, lured by the temptation of the snap-shot and the fascination of a detective camera, places him in the most trying position possible, and at the same time places him in a possible field of interminable waste. Waste which accompanies poor success of any kind, tends to discouragement and ultimately to the abandonment of the undertaking. This can only be overcome by careful forethought and critical observation. Memory fails to retain all the minutiæ of detail with the average man. It may be some trouble to note down the results of one's experiments and observations, but in the end it pays a handsome dividend. Though the writer long since abandoned the note-book, yet occasions do occur when a reference to the old notes refreshes the memory and determines a course of action which otherwise might have involved a wasteful expenditure of plates and chemicals, not to mention the time lost and the discouragements and vexations resulting.

One who contemplates launching upon the experimental stage of photography would do well to consider carefully what he is going to do and how he will reach it. This necessitates an analytical knowledge of the art that a proper point of embarkation may be secured. It is a well known fact that a child must creep before he can walk. We acquire a knowledge of the unknown facts of life through our concepts and percepts of things already known to us. Our procedure then should follow the order of nature, and starting at the least difficult point, should progress carefully from the known to the unknown, adding but few new points at a time until all is mastered. By such a course a far less number will be yearly found abandoning the work. By this method one can so perfect themselves that encouragement is found instead of disappointment, and a knowledge of the art of practical value for future convenience and skill.

From my experience I have discovered that there are several departments of work in photography, each almost a science in itself, which are building blocks that have their appropriate place in the structure of photographic knowledge, and the foundation block of all the others is the most important, as in any other building art. A pupil cannot be a grammarian before he learns to read. A building without its concrete and stone base cannot long stand. If you would obtain the greatest pleasure at the least expense, lay well your foundation and place right the first or lowest stone.

Carefully considered we may classify all photographic work into eight departments, viz.:

Time landscapes, time architectural views, interiors, portraiture, lantern-slides, snap-shots, flash-lights and photo copying. These, in the order given, produce an easy grade of advancement. To any rational person it would seem an absurdity to advise photo copying for a first lesson, likewise flash-lights, and yet how many do we see who think it just the thing to commence with a detective camera and snap-shot, but the third stone from the top.

Such a beginner has laid out for himself a difficult task or a hot bed of discouragement and expense.

In the analysis I have laid down, there is an order of succession, which I have found to be practicable and productive of the most thorough results in all cases where I have given instruction. First, we must learn to know our lens, and form its acquaintance by the most simple tests. A simple landscape exposure, on time, gives you an opportunity to grasp the principles of focusing, of distance, of time, of light, of developing and the required familiarity of your lens, in a field where no accidental or peculiar emergencies arise. This will make a lesson sufficiently difficult for several weeks' practice, and is the point where the use of a note-book will prove of great advantage. This will be the longest and no doubt the most severe task of all, nevertheless it should be strictly adhered to until a satisfactory negative can be produced that will bear favorable criticism.

When architectural photography, including views of buildings of all kinds is undertaken, the necessity for a swing-back is apparent, and the lesson lies in the adaptation of the swing to various subjects and positions.

From outdoor work we would turn to indoor views not including any living objects. Here new features present themselves as to light, exposures, position of camera, effects of

reflection. This will be a lesson requiring much time, perseverance, patience and care. However great the temptation, do not take up portraiture until you have fully under your command the taking of interiors.

Portraiture is an art by itself and possesses many peculiarities which cannot be met successfully in any manner except in a gallery specially constructed for the purpose. Some buildings may be found where rooms will have the needed requisites, but they are few. Under certain conditions good portraits may be taken out of doors, and more especially is it preferable in taking groups. With the data and experience now acquired, the student may be safely left to work out his own salvation. At this period, lantern-slides, snap-shots and other branches may be discovered by the student at his option.

In the finishing of a print the method admits of little classification. The variation lies largely in the many formulas given. Some achieve success by one, others by another. The student should take some one well recommended process and adhere strictly to it regardless of the suggestion of any one.

If failure meets you, seek to find and remedy the cause. Adopting a new formula does not rectify the evil but invites more disappointment. When you have once succeeded so that you can call from the baths a print of a certain tone, then will it be safe to experiment on other formulas.

In writing this article I have hoped to establish principles of action and precedure which will be a help to the beginner, when used in conjunction with the detailed advice heretofore given in these pages, and to call attention to a graded course of study and experiment which will present the minimum number of obstacles and be least likely to present discouragements tending to deter amateurs from proceeding on the road to perfection. If carefully followed I am sure it will bring you ultimate reward and pleasure.

In any case a beginner must look for much waste of time and material. It is the price paid for the knowledge obtained. Economy, however, need not be set aside. Such information, systematically obtained as indicated above, will be dollars in one's pocket, and success in the work. Hundreds fail and give up, who now might be successful operators for want of steady, well-directed effort.

Haste makes waste, method and care ensure success.

W. B. Dimon.

PHOTOGRAPHING THE WAR SHIPS.

The great naval review of the war vessels in our harbor in the past year furnished abundant opportunities for snapshots, and to the successful, beautiful prints. Scores and scores I have seen of all characters; and it occurs to me that a few suggestions regarding such exposures might not be out of place.

First.—Do not make your exposure with the stern of the vessel head on to you. The effect is grotesque, for you will have a something looking like one of the Caravels—only more so—a stern high up in the air, and the bow running off to nothing in the distance, creating the impression that the vessel is about plunging headforemost into the sea. The effect is hideous, for we do not now see, or so picture in our mind, any such kind of craft. And yet I have been shown many otherwise beautiful negatives so taken, and strangely enough the uncouth appearance not noticed (?) by the maker. When attention was called to it, *it was seen*, and so well seen that the picture was no more cared for or shown.

Three points of view only are allowable. The one giving the most correct delineation, with the vessel broadside on to you. If it will not all go in, be sure and have the bow in and leave the stern out. Again, at an angle of about 45 degs. In this case, do not have the vessel *to entirely* fill up your plate. The effect is then good and oftimes very spirited. *Of course, head on.* Also, directly bow on. Of this exposure be chary, as an occasional one only will give satisfaction.

Second.—When you can have the choice of circumstances, make it that not only the sunnyside of the boat is to you, but that the light falls upon the bow, instead of upon the stern end of the vessel. Although by no means essential, it is decidedly better.

Third.—If the vessel is white, the best time of the day is at about noon, when the sun is high, for with the light striking full upon the side and again reflected thereon from the water, you will have a white vessel, so hard, that do what you will, it will be of the *chalkiest kind* in the print. For a black vessel it is the reverse, as with our present plates and cameras, there is not the least difficulty in securing admirable negaatives from off a steamer passing an object, or even of a steamer going contrariwise to the one you are on. It needs, indeed, a quick and instant touch of the finger upon the trigger, something like shooting a bird upon the wing with a fowling piece, and that is all.

J. J. Higgins. A.M., M.D.

A NEW FIELD OF WORK.

Photo-engraving, with especial reference to half-tone and line work on zinc or copper, is rapidly coming to the front as an employment. Original work made either from pen or India-ink drawings finds a ready market. There should be no good reason why many photographers could not add to their regular work this branch of art, and so increase their revenues and add to the growth of illustrations for newspaper and book-work, in many a country town such work would be in demand if some one could furnish it as a home supply. The ordinary photographer possesses facilities for doing this work, and doing it well, The only real additional means needed of any value would be a routing machine, but thirty or forty dollars will now procure one of these that will do the work, and in almost every town a spare corner, with power, could be utilized. The great drawback heretofore in this art has been the difficulty and cost of procuring reliable information or instruction as to the mode of doing the work. This day has passed; for, from my every-day practical observation of all these processes, and a careful comparison with two of the most valuable works printed on the subject, I can safely affirm that if any one wishes to undertake photo-engraving as a business, or a pastime even, that for two or three dollars' worth of literature that one can rely upon, will be sent them by The Scovill & Adams Co. I have especial reference to the book entitled "The Grammar of Photo-engraving." This article has been written not as an advertisement of these books but as an expression of a conviction that there is a field here for some one, a field that is by no means fully occupied, and is full of beauty and promise.

Rev. Dwight W. Smith.

NOTES ON FILM-HARDENERS.

The want of a good hardening solution for gelatine negatives led me recently to make a few experiments with alum tannin, etc. These experiments, however, came to an abrupt termination on my testing a commercial mixture known as "Helmold's Hardener." This is, as definitely described, a crystalline compound, but evidently containing a considerable quantity of sulphite, or acid sulphite salts. The mixture has been recommended as a hardener for gelatine negative films,

EMILIE V. CLARKSON, PHOTO.

or for gelatine positive processes. According to the manufacturer's statement, it serves to render them heat and water proof.

Photographic nostra I have invariably looked upon with scepticism and suspicion, but in the present case an exception must be made, as my practical tests show that Helmold's hardener is capable of performing all that it is claimed it will do.

To apply the substance successfully to a gelatine negative it is advisable to make a solution in the proportion of one in ten and filter it.

The negative is immersed in this for about three to five minutes, and well washed. After this the plate can be dried by heat, when the film becomes so solid and firm that a sharp-edged tool is almost incapable of scoring it.

Owing to its great energy in solidifying the film so as to resist a high temperature, all hypo and derivatives of the fixing process should be completely removed before the hardener is employed.

The film becomes so hard after its application that a secondary washing could not possibly affect the removal of any substance left in it. Negatives of doubtful printing density should not be subjected to the Helmold hardener before their printing quality is ascertained, by making a proof, inasmuch as the film, becoming so extremely hard, the intensifying solution would have but very little effect, if any at all, the same as a plate remaining for a long time in the acid fixing bath. The same with over-dense negatives, upon which none of our reducing media would act sufficiently well after the Helmold solution has been applied.

We have not been annoyed with the frilling of plates during this severe and cold winter, but propose Helmold as an "anti-friller" whenever it becomes necessary to resort to such a remedy.

While experimenting with this substance we have taken into consideration the frilling of plates, and the softening of the film during the hot season, and to utilize Helmold as a preventive or a curative has been a matter of mature consideration. Fortunately our American plate-makers have reduced the possibility of plates frilling to a minimum, but nevertheless in very aggravated cases, high temperature, and the atmosphere highly charged with moisture, the annoyance may obstruct our labors to a very considerable extent.

We are never sure whether with this or that plate frilling may occur, and for that reason a preliminary bathing of the

film or plate is not advisable, it would only retard development to a very considerable degree, and be as detrimental a remedy, as the evil itself. Much better, we think, would be to keep on hand a weak, say a 1 or 2 per cent. solution, and add enough of it to the developer, when its action is desired. Much better than the old alum or chrome alum bath, we think, Helmold would act if interposed between developing and fixing, although we doubt not the hardened film would require a much longer time to be fixed.

In the positive printing out process on gelatine emulsion papers, the Bradfisch, the Omego, the N. Y., and others similar, Helmold gives us advantages of extraordinary bearing, namely, in the way of mounting prints made upon these papers.

When aristo papers were first introduced we had endless trouble to mount these prints accurately and neatly. We have squeegeed them to make them glossy, but had to mount them dry to retain the gloss, and if inadvertently a little paste found its way on the surface of the print, wiping it off necessarily destroyed the beautiful gloss we had been so anxious to retain. With the Helmold solution these evils have been averted. On account of the thinness of the gelatine film on printing papers, the solution need not be of as high a concentration than for negative plates or films, a strength of one in twenty-five being evidently sufficient, according to our own special experiments. Filtering of the solution is necessary, and well rinsing of the print in pure water, equally so.

After the prints have been in the solution for three to five minutes the film has sufficiently solidified, and after washing as before stated, a whole batch of them may be piled up just the same as albumen prints, and pasted and mounted in the same way.

A squeegeed gelatine print treated with Helmold retains its gloss, and those not squeegeed become almost equal to burnished ones. The film having become hard and solid may, after mounting, be wiped or sponged without detriment; in fact, the mounting of gelatine pictures has been made as facile as those on albumen paper. Bromide prints may be treated in the same or similar manner.

We predicted several years ago, that if any new method of printing out would ever supersede that with albumen paper, it was the destiny of chloride of silver gelatine emulsion papers to do so. Facilities as those described, tend vigorously towards the realization of our expectation.

Max Madder.

PRINTING ON MONOGRAM PAPER.

After the processes for the production of a superlative negative have been mastered, the next serious problem presented is how to obtain a print from a negative which will faithfully render all that it contains.

In my opinion the printing process which will faithfully do this has yet to be discovered. Printing with the chloride of silver and solar rays is at its best unsatisfactory, but when a professional photographer is in a hurry and has engaged to deliver eight or ten dozen prints at a specified time, and there happens to be cloudy weather for ten or twelve days, the imperfection of this method becomes painfully apparent to this professional, and although he may never give external expression to his sentiments on the subject of the perverseness of the great luminary of the heavens, yet we who have had some experience of this sort can judge quite accurately of the extent of the internal war and unexpressed anathemas.

Yet the product of this physical and mental labor is an imperfect and transient positive. Time plays its fantastic pranks with it, veiling it with a dirty yellow and obliterating its fine details. Looking at the average print which has been for a few years subject to the destroying influence of time, the question voluntarily presses itself upon the mind, is this the end, the final of vaunted photography? Is there no other way? Is the *law* immutable which decrees this?

Answers to these questions have for several years past occupied more of the attention of both professionals and amateurs than any subject connected with photography. Many devices have been invented for producing prints from photographic negatives by mechanical means, most of them corresponding in some respect to the lithograph process, and I think printer's ink has been universally used as the coloring matter.

Some of these methods, the best, have only succeeded in making passable prints—most of them are worthless, producing only caricatures on the name of photography. None of them give but a small part of the fine, delicate detail contained in a good negative. Latterly these processes have been used to illustrate photographic periodicals.

If this has been done to advertise the process (which I presume is the case, as the author of the specific method used is always given), there is some excuse for the multitude of *stuff* labeled "illustration," which has been a blemish and an eyesore in many of our leading photographic journals. If the

proprietor of a journal is paid an extravagant price for the privilege of such an advertisement, that is all right, but in every instance I think an apology and a disclaimer is due to the patrons of the journal, and should accompany such unsightly stuff every time.

The process which to my mind promises the most at the present time, is one which depends on development the same, or nearly so, as a negative is developed.

The monogram paper with which I have been been experimenting, is paper coated with a very sensitive gelatine emulsion. Tested by the sensitometer it showed a little above fifty, so that an exposure to the flame of a 2-foot gas burner at a distance of 12 to 18 inches should range from two to five seconds, according to density of the negative used and force of developer.

The most serious difficulty which I encountered was a proper fixing bath. Hyposulphite of soda I could not use successfully. The effect of such a bath seemed to continue the development and cloud the whites and flatten the whole print with a dull, unpleasant gray tone, neither the high lights or shadows were clear. I tried sulpho-cyanide of ammonia; this bath seemed to attack the gelatine.

The fixing salt with which I finally succeeded to my entire satisfaction was the hyposulphite of ammonia. This chemical is not manufactured in this country, and is only found in ounce bottles and costs $2 a pound; one manufacturer of chemicals charged me $4.80 a pound. The price in Europe is 60 cents, which, with a duty of 25 per cent., would make the importer a good profit at $1 a pound. This compared with the soda salt seems extravagant, but I found that 1 ounce of hyposulphite of ammonia was equal to 2 ounces of hyposulphite of soda. This fact made the comparative difference in expense between the two salts more favorable.

It is probable that this chemical will be made in this country as soon as there is a demand which will justify it; there is not much prospect, however, of its being sold as cheap as the soda salt, the superiority of the ammonia hypo would, however, in my opinion, cause it to supersede the soda hypo.

I made a variety of experiments trying to produce a substitute for the ammonia hypo.

The one most successful was made as follows: To 8 ounces of strong ammonia I added 4 ounces of water; this compound I dissolved hyposulphite of soda to saturation. In this process a large portion of the ammonia is taken up and a fixing solu-

tion made by taking 1 ounce of it and adding 4 ounces of water will make the fixing solution strong enough, the remaining ammonia in this fixing solution should be neutralized with sulphurous acid. This I made by dissolving sulphite of soda in sulphuric acid; it will require only a small quantity.

This solution answered a very good purpose for fixing these developed prints.

I tried to convert the sulphate of ammonia into hyposulphite by the same process, by which sulphate of soda is changed to hyposulphite but did not succeed.

I tried several other methods with fair success, but will not take the space to give them in detail now.

The next important element in the production of developed prints on this paper is the *developer*. The formula which came with the paper was one of ferrous oxalate. I did not succeed with it to my entire satisfaction, but after trying many kinds I adopted the following: Water, 1 ounce; sulphite of soda, 15 grains; bromide of soda, 1 grain; carbonate of soda, 5 grains; hydroquinone, 1 grain; metol, 2 grains. Those wishing a more active developer can increase the quantity of carbonate to 15 grains, or to any point between 5 and 15. A developer, however, which rushes is difficult to manage, and the exposed paper will be over-developed. The color which a developer gives is important also in this work. Metol works very rapid. Hydroquinone is slow but continuous, much more so than metol. These two, in the proportions given, steadied by the bromide of sodium, work satisfactory in every respect.

I don't know that the monogram paper with which I have been experimenting is superior to other brands of paper prepared in a similar way. This paper was sent to me to work out and try and produce warmer tones. My first effort was to secure satisfactory black tones with perfectly clear shadows and pure high lights. There is a formula with each package for producing warm tones which I have not tried.

My experiments are largely embryotic, yet to me it is an inviting field and the promise and the prophesy to me is exceedingly encouraging, and I hope others will be induced to investigate this method of producing positives.

When it is mastered the photographer becomes wholly independent of solar light in the production of prints; a gas burner or an ordinary kerosene lamp will furnish all the necessary light, or weak diffused light will answer, although I prefer a more direct light. In the process I have detailed no

toning is required, and there is no reason why such prints should not be as permanent as an ordinary negative; they can be immersed in the ordinary alum bath for hardening the gelatine and eliminating the hypo, which may not be as easy as a film on a glass plate.

The hypo can be thoroughly discharged by immersing the prints in a weak solution of nitrate of lead cleared with a few drops of acetic acid.

Henry J. Newton.

A NEW IDEA IN THE MAKING OF LANTERN SLIDES.

In trying to include a number of photographs upon one slide, not long ago, I hit upon the following novel way of accomplishing the result:

Cut the unexposed lantern slide plate into as many pieces as you desire pictures on your finished slide, and also of the shapes which you desire the small pictures to be. This can be done with an ordinary glazier's diamond, and you can vary the finished slide greatly by the different shapes of the small pictures

For instance, it can be divided into three equal parts by two cuts of the diamond, either horizontally or vertically. The center picture may be a circle with triangular or circular pictures for each of the four corners. Very attractive results may be obtained in this way, and the number of pictures of the same or similar subjects, shown on one slide. When it is projected upon the screen it appears not unlike an exhibition frame of several pictures matted together.

This is also an excellent way of showing on one slide the different effects of varying exposures on the same or different plates, or it may be used to exhibit on one slide the different effects of a number of developers.

After the slide has been cut into the desired number of pieces, and of the shapes desired, print upon each the picture which you wish to occupy that particular place on the finished slide, and when all the smaller pieces have been printed upon, arrange them upon a plain mounting glass in the exact positions which they are to occupy. Paste them to the glass by means of black paper, which will cover the margins, and bind the whole around the edges with the same material.

David G. Archibald.

A BRACE OF SUGGESTIONS.

It may fairly be presumed in view of all the discussion and experiment touching the proper light by which to develop plates, that each man has settled upon what he has found the most satisfactory. Upon this matter I have nothing to say beyond the remark that I have found a gas jet with argand burner outside the dark-room, with two sheets of orange glass and a ground glass interposing, to furnish a light that is safe and agreeable. A semi-circular yellow curtain, running on a wire, and occupying a wall space of about thirty inches, serves the double purpose of excluding all daylight, and, by its reflecting power adding greatly to the volume of light. I prefer gas to daylight because you can have more illumination with less chemical rays. But it is the *general* lighting of the dark-room that I had in mind. From what knowledge I have, dark-rooms are literally such; they may be said to be illuminated by darkness; the light that can be admitted through the developing window hardly gets beyond the sink, and one goes about upsetting and breaking things because he cannot see what he is doing. What I think is a clever way of obviating this trouble is to have light admitted through the sides of the room near the ceiling. A row of yellow panes running along the top of the wall will afford a comfortable light to work by anywhere in the room, and be at such a distance from the plates you are handling as to be quite harmless, unless from a long exposure. I suppose that every one practices covering the tray when the development has to be prolonged. The supposition upon which I have proceeded is that the dark-room opens out of the operating-room, where the light is quite different from that admitted from out-of-doors. In the latter case two thicknesses of the yellow glass would be required, and perhaps a yellow silesia curtain that could be drawn over during some portion of the day, might be necessary. Any one acquainted with photographic operations would accommodate himself to the circumstances. The point I make is that dark rooms may have, in addition to the window you develop by, light admitted near the top sufficient to work by and yet be safe.

The other suggestion is that something in the nature of a scrap-book be provided in which you put a print from such negatives as illustrate your happiest efforts in posing and composition. To these may be added many other things—photographs that one can buy, and pictures of whatever sort that

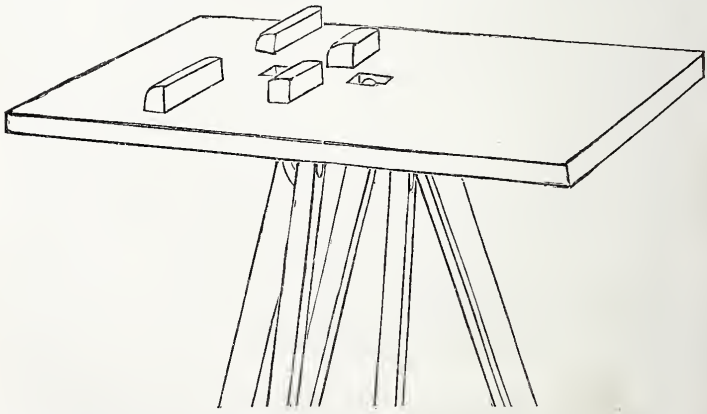
show artistic attitudes. Paintings and engravings can frequently be borrowed from the dealers from which to make a small copy. Of course pictures from such a collection are not to be used as patterns in making future sittings, but afford suggestions and are valuable as studies. One is not always fresh or at his best, and it will frequently happen that you have a subject in hand that you wish to make all you can of, but your brains seem on a strike. Then a little turning over of the leaves of your scrap book will suggest something to help you out. It may be one of your own things—some unique accessory effect perhaps that you had quite forgotten. If one does not live in a large town where works of art can be obtained to copy, a little sketch (if you can draw) when an opportunity offers to see these things, will be all that is needed.

To a photographer, who, from the nature of the case must be a minute man, unlike the portrait painter who can pore over the management of a single picture for days or weeks, this plan I think will be found helpful.

G. L. Hurd.

AN INSTANTANEOUS TRIPOD TOP.

Who has not been annoyed by the loss of time occupied in unfolding the bed, fastening and screwing on a view camera to



the tripod top, especially when some picture of a passing object is wanted.

The accompanying cut shows a tripod top which instantly

holds the bed rigid and secures the camera to the tripod. Beside the usual round top a somewhat larger one is provided which may be either round or square and permanently fastened to the smaller top with a thumb-screw. Four small blocks of hard wood (or if preferred angle irons) are screwed to upper top in such a position that when the camera bed is opened out straight the cross-pieces to which the hinges are fastened fit tightly between them. This holds the bed perfectly rigid and the camera firm enough for ordinary usage.

When the camera is removed it should be lifted straight up before attempting to fold the bed as that would have a tendency to pull off the blocks.

This top effects a considerable saving of time especially with the older cameras which have a screw to hold the bed rigid which requires many turns to get it in place.

E. B. Luce.

THE PHOTO-MICROGRAPHIC IMAGE.

Ground-glass has been universally adopted for focusing the image, and though it is perfect for general purposes, it is incorrect for photo-micrography with high or even medium powers. To the best of my knowledge the following method is original with me:

An unexposed plate is put into a solution of hyposulphite of soda until it is clear. It is then washed thoroughly and placed for five minutes in a weak solution of sulphuric acid, rocking it in all directions from time to time. Without draining the plate it must be placed in a solution of barium chloride and it must be rocked until the plate is uniformly white. A precipitate of barium sulphate has formed immediately throughout the whole film and this precipitate (known technically as *Blanc fixe*) is of microscopic fineness. The plate can now be slightly washed and must be laid horizontally to dry, after which it is much more translucent than ground-glass and an ordinary magnifying glass fails to detect any grain. As a glass on which to focus the photo-micrographic image, I have had wonderful results because the surface of this glass is equivalent to the surface of the subsequent sensitive plate. It supersedes plain glass also inasmuch as there is a difference in thickness on account of the film and with particular photo-micrographs even the thickness of a film is perceptible.

Maximilian Toch.

A COMPOUND NEGATIVE.

One of the most difficult things ever allotted to man to perform, I fancy, is to write an article on Photography in May 1893, which will be readable as something new in January 1894.

Photographic achievements, however novel, age in these years of progress of the art, in less time than it takes to get a description of them in print for publication.

That portion of the public which hovers about the camera, greedily reads something new every week in our Photographic Journals, and yet like Oliver Twist they ask for more.

Having found that it is useless to try to get ahead of progress in the race around the circle, I mean this time to try going back over the track, and perhaps I may retrograde to the mark, in about the same time that progress goes around the course and advances to it, and those who were not in at the beginning of the race, but who only see the finish and do not know all the particulars, may give me credit for having kept up with the rest. I am going to write of something old.

Several years ago when dry plates were not as good, and did not run regular in the same package as they do now, an elderly gentleman, a railroad president, whose time was entirely taken up with his business, came in a great hurry to have his photograph made. I made one exposure for a cabinet bust, and was about to make another, when he rose from the chair and, saying that he "must meet an engagement in a very few minutes," requested me to send him a proof, and if it was not satisfactory he would try to make an opportunity to sit again. As he was a very wealthy man, with a large circle of relatives and friends, I knew that a good negative was sure to bring large orders from him. At the same time, I felt that a negative to be good, in his opinion, must be one which was taken at some time when the mood was upon him, and he felt just like he was going to get a satisfactory picture. So I let him go, thinking that it would be easy to get a resitting if necessary. That night, after closing the gallery, the negative was developed, but the best image that my knowledge of dry plates, and the most persuasive developer at hand, could get on that plate, was too thin to print from; so it was laid aside after washing, and a resitting asked for. Believing that errors are important factors in all experiments (dry plate working was little more than a universal experiment in those days), I made a practice of carefully washing out the hypo and drying

all spoiled plates, in order to study them afterward, and if possible detect the cause of their failure and profit by it.

Time went on, but my railroad president never returned; he was always too much occupied; then he fell sick and died. Some time afterward his widow came to inquire if I still had the negative. I had it such as it was, but as there were no pictures of him in existence, she insisted on having at least one print from it.

With good bromide paper, it would have been possible to make a short exposure enlargement from the thin negative, and, after working it up a little, photograph it down small again and thus obtain a printable negative, but bromide paper at that time was in the hazy future.

Several ways of improving the printing quality of the negative were tried without success; then it occurred to me to make a transparency by contact, retouch it a little very finely, and from that a negative by contact also, retouch it for contrast, then superimpose it upon the original so that the two registered exactly, and seal them together by pasting strips of paper around the edges. This compound negative was printed from in the shade, and the result was a beautiful, soft, pearly picture, which gave such satisfaction to the family that the orders for prints were so often repeated, that I almost wished at times that the negative would break, so tired did I get seeing prints of it. But it paid for the worry and trouble of the first work. It paid in good "coin of the realm," besides giving me an experience which has profited me many times since, and which may profit some reader, who wishes to make a paper print having all the soft beauty of a fine porcelain, if he will try the experiment for himself.

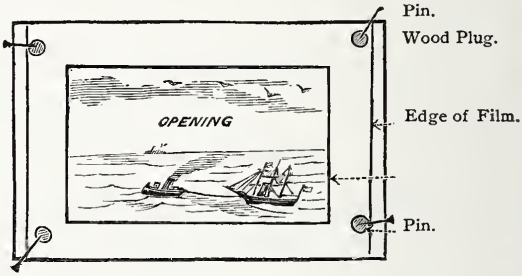
Harry Platt.

A NEW DODGE.

There is always more or less bother and trouble in developing rollable films, because they are curly and won't lay straight in the developing dish. I have tried very many ways to hold them down, and found the best way was to use a wooden developing dish, or a rubber one with a wooden false bottom put in, and then sticking a pin in each corner of the negative, pinning it taut and fast to the wood.

With this plan I could not examine a film negative by transmitted light. I therefore put in a piece of glass, secured by

paraffining it into the bottom of the tray. This did very well. Recently I struck upon another plan, which is the best of all. I took a piece of hard rubber plate, such as is used for squeegeeing prints on, and cut it to 5 x 8, the size of my tray. Out of the centre I cut out a space 3 x 6, leaving a frame as it were an inch wide all around; in the corners of this frame, at



a proper distance, I drilled four holes three-eighths of an inch diameter and plugged them up with soft pine; my negatives being 5 x 7, I pinned them in the corners to the pine in the drilled holes. This is the best and cheapest method I have yet used or seen, and it answers the purpose well.

Thos. J. Bray.

COLLODIO-CHLORIDE, ARISTO *vs.* GELATINE PRINTING-OUT PAPER.

As the above subject is of much interest to the photographic fraternity at the present time, I take up the subject to show my method of working, and show as to results obtained. During the past eighteen to twenty months I have experimented with almost every known variety of papers, both English and American, and marked the results both of collodio-chloride, aristo, and gelatine-aristo papers, and must say from the experience gained by the experiments, that with me the collodion paper leads, being so easy to work in every detail, and the results so satisfactory at the finish.

Now, perhaps, to all appearances the gelatine paper is fully as good as the collodion, but there is less latitude in your negatives. To get uniform results you must have uniform negatives, not too hard, or even too strong and brilliant; but very soft, thin negatives are the best for gelatine, whereas col-

lodion papers require just such negatives as we have been making during the reign of albumen, good, brilliant negatives, giving the best results.

In printing, you have to print gelatine paper even farther than we did albumen, as they give so much in the toning; collodion paper you only print a very trifle darker than the finished print is to be, as it gives but little in the toning, it being more sensitive and not needing to be printed so dark. I can print four to one of gelatine. As time saved is a very valuable point, especially in dark weather, this of itself is no small item. During the past winter and spring it would have been impossible for me to have turned out the work I did, had it not been for the advantage gained in speed of printing during the cloudy weather.

I know to those who have not tried that the hot water method is a bugbear, but it is simplicity itself, and I would not wish to go back to the old method at all. When you have tried it you will see how simple it is, and that it is not the difficult job you thought. Instead, it is a very pleasant operation, especially during the winter season, when the temperature is at zero and lower, there is no need of getting rheumatism dabbling in cold water. The way I do is much the same as the instructions with the paper, perhaps a little modified, and will explain my way. I take a glass-bottom or porcelain tray, and having first prepared the water to the desired temperature, say just so you can bear your hands in it without any discomfort of its being too hot, I pour enough in the dish to nicely cover the bottom only. I take up my prints and lay them face down, pressing on the bottom of the tray with the palm of my hand to make them adhere to the tray, flow the water over the back and lay another on top, lapping a little over the last, and so on till the bottom of the tray is covered; then I start over again, being careful to lap the joints of the last layer, repeating the operation till all are in the tray, rocking the water well over the prints before placing next one down, to avoid sticking together, adding a little water as the paper absorbs the water already in the dish.

When all the prints are in and moistened, I pour off the water and add fresh warm water, rocking the tray for a few minutes and repeating the operation until all milkiness in the water disappears. I do not handle prints any more in washing, as there is a slight curl to the paper which separates each print from its fellow if placed in the tray properly, allowing the wash water to pass freely between the prints. This is better

than the heavy gelatine paper, which being heavy requires separate handling to wash them, as they sink and lay close together at the bottom of the dish.

When prints are washed I then put on a good volume of cool water and proceed to tone. Now you require but a third of the gold as in albumen or gelatine, making a great saving of gold. Use your own favorite bath. Gold neutralized with carbonate of soda is the simplest. When toned, which will be in about six minutes, throw into a salt bath to stop action of toning solution, and when all are toned fix them in an ordinary hypo bath as for albumen. I wash as before by rocking dish, or place in running water; they need no attention, as the curl separates them; about twelve changes of water or two hours in running water is sufficient; then proceed to mount, using a good stiff starch paste; but instead of using your hand or roller to rub down with, use a squeegee, which brings the print in closer contact with the mount, squeezing the paste to the edges of the prints, causing it to adhere firmly to the mount. I have yet to see one of my prints to curl off the mount, as is complained of by those using a roller or hand methods. I spot with albumen as a liquefier and burnish in the usual way, not having the prints too dry or the burnisher too hot (I use a bar burnisher at that), and the operation is complete.

I have had albumen, gelatine and aristo paper in a show window, south exposure, all winter, exposed to all the sun we have had. I have them before me now. The albumen looks beastly, gelatine little better, from the fact that the frost thawing from the window has spattered the face of the print, and caused blisters and red spots wherever the water has laid, though apparently no fade-out has taken place. The collodion being water-proof has come out as nice as when put in; in fact, I wiped it off with a damp silk handkerchief and it looks as well as ever it did. I am aware collodion paper is more expensive to buy, but when you consider the saving in gold and the time saved in printing, it becomes the cheapest in the end, especially when the results are so fine you are money in pocket. I have used considerable blue label aristo with the above results. It is to be hoped the makers will reduce their prices so as to compare in competition with other makers. I was always troubled with metallic spots and red marks in gelatine, but that is all done away with now. I can wash and tone a batch of prints in less than half the time by the above method that it takes to tone with the ordinary cold water

method, besides the pleasantness of it—no cold fingers or rheumatic pains through handling cold water during cold weather.

J. A. Lord.

ON RECORDING THE POSITION OF THE SUN WHEN MAKING AN EXPOSURE.

I ALWAYS keep a record of the position the sun occupied when a plate was exposed, and record this with other important matters, such as temperature, magnetic direction of the camera, condition of the light and time after sunrise or before sunset.

After some years I find my notes invaluable in trying an unknown subject. The majority of negatives fail as pictures because the light falls in such a way as to break up the simplicity of the composition; it frequently happening that two pictures of the same subject taken within an hour of each other will be very dissimilar, one being pleasing from the broad masses of light and shade, the other irritating because these restful masses are broken by the light striking at the wrong angle.

The apparatus which I use is a compass sun-dial, the sun-dial needle of which is a hollow tube one-tenth of an inch in diameter. Down this tube the sun passes and records its position. The only other change required in the instrument, is to make the arc carrying the hours revolve concentrically with the graduated circle of the compass. To use the instrument, place it on the top of the camera and make it level. Then turn it so that the north point of the compass circle will point in the same direction as the camera.

Next rotate the circle carrying the hour arc and elevate this arc until the sun shines down the hollow needle; read the horizontal circle and the vertical arc and you have the exact position of the sun in regard to the camera. Observe the magnetic direction of the object photographed, and if near sunset or sunrise, the place where the sun rose, and record all these with time of the year, the hour of the day, the condition of the light, the length of exposure, and after a time you will have an invaluable series of notes which will save the loss of many plates.

William Rollins.

SINGLE *vs.* COMBINED TONING.

With the introduction of the now popular gelatine and collodio-chloride emulsion papers came a revival of the old combined toning and fixing or *sel d'or* bath with its ease and simplicity of manipulation, but to those who had a previous knowledge of this process and its unsuccessful results when applied to albumen paper, giving as it did sulphur tones and great lack of permanency, came many doubts of its possibilities on the new papers which only the test of time could overcome, we are now, after an experience of several years, able to assert that with the exercise of proper care in the selection of a bath and its proper use, not only can any and every tone equal in all respects to those given with two baths be secured, but, permanency as well. The writer has in his possession gelatino-chloride prints toned and fixed in one bath by an average amateur which were afterward exposed in the window where there were no shadows and where the sun had its full effect all day, for nearly four months (an exposure such as this is equivalent, according to no less an authority than Professor Rood, of Columbia College, to over one hundred years of ordinary use or exposure such as they would get if mounted in an album or framed) and at the end of this time no change whatever was visible either in the shadows of high lights; truly a remarkable record.

In using a bath of this kind the following points are well to remember: Get a good formula containing gold,—there are many of them given in the Annuals, and if it is neutral all the better; or, better still, buy one of the many ready-mixed baths of standard quality with which the market abounds. Stick to one bath till you thoroughly understand it, but don't use it over and over till all its gold is gone and the power of the hypo to fix exhausted, and expect good results. Get a new lot. It is cheaper and better in the long run. Don't be misled by claims for "no gold" toners, the results of using which give sulphur tones and only spoils your temper. In summer put a lump of ice in your bath; you will get purer prints by doing so, and never fail, when the desired tone is reached, to put prints in a solution of salt and water; salt one ounce, water thirty-two. To stop further toning, afterward wash one hour in running water.

If used in this way, the result will be a satisfaction that will increase with experience.

J. A. Vanderpoel.

No. 1. A REMINISCENCE OF WINTER.

No. 2. UNDER THE WILLOWS.

PHOTOGRAPHING SNOW SCENES.

Many amateur photographers seem to consider the warm months as the best, if not the only, time in which to pursue their favorite pastime. This is especially true of the beginner, who usually purchases his camera in the early summer, and makes his first experiments with it during the annual outing of his vacation. But those who put their cameras away with the approach of cold weather lose some of the finest opportunities of the year for making artistic landscape pictures.

Nothing can be more attractive than the snow-covered landscape, with the trees ice-coated or bare, as the case may be, and with glittering whiteness at every hand. It requires experienced judgment, to be sure, to reproduce such a charming scene satisfactorily with the camera, but it can be done when care and experience are brought to the pleasant task.

There are two general classes of snow scenes; the first, in which everything is completely enveloped in white, and the second, in which strong contrasts are presented by the bare, black trunks of leafless trees and the glittering white of the snow on the ground. In the first class, trees, bushes and everything glisten with ice, and the fields sparkle beneath the snow. There are no contrasts, only a mass of brightness, glitter and glare. Here the difficulty is to give form and outline to the scene, gradation and half-tone in the lights and shadows. It must have this in order to be satisfactory.

In order to photograph such a scene we must select the time of day when the sun is at one side of our camera, and a little behind it. This may be in the early morning or the afternoon, depending, of course, on the point of view we have chosen for our camera. The picture may be selected on one day, and the light noted. On another day at the proper time we return to the spot with our camera and make the exposure. In the early morning or late in the afternoon the shadows prevail, if at all, lying across the snow in long, soft masses of gloom, giving contrast to the view and somewhat subduing the light, and it is only at such a time that such a snow scene can be photographed. The exposure should be moderate, and the development rather brisk in order to bring out the proper contrast.

Our first illustration is from a photograph typical of this class of pictures, though in the reproduction the delicate frostwork which covered the trees and made them glisten in the sun is lost, so that a greater contrast is shown in the

illustration than was really present in the original picture in nature. Of course the effort was to produce contrast in this instance, as it was to overcome contrast in the second illustration, for the tendency in the first case was toward flatness and lack of detail, while in the second case it was exactly the reverse. The photographer must regulate his lighting, exposure and development so as to offset and overcome the natural tendency of the subject.

The second, and perhaps the larger, class of snow scenes is quite different from that we have been considering, and as a consequence must, of course, be photographed differently. In it we have pictures of the greatest contrast—dazzling whites and densest blacks; a hill covered with glittering snow, lined on its summit with the darkest pines, and similar pictures. Our second illustration is typical of this class. The question now is to overcome contrast and give softness to our photographs. As before, the light must be subdued, and the exposures are therefore made either early in the morning or late in the afternoon as before, and overcast days are employed as far as possible. The sun must illuminate the picture from behind the lens or a little to one side as in the other class; but the exposure must be ample in order to provide for a very slow development. Orthochromatic plates are especially desirable for this class of work, as they harmonize the contrasting dark greens and browns with the whiteness of the snow, and so obtain a more natural and pleasing effect in the finished photograph. Non-halation plates also can be used here to great advantage, requiring, as they do, longer exposure, and absolutely preventing halation.

In the development of snow pictures there is room for the exercise of the greatest skill. When the exposure has been short, as in the case of the first class of snow scenes mentioned, the developer must be of full strength in order to bring out all the contrast possible. The pyro and potash developer as prepared for instantaneous exposures will be found to work well with these briefly timed snow pictures. For developing amply exposed plates on subjects too full of contrast, a milder developer should be used. I prefer to reduce the pyro and potash developer to at least one-third of its normal strength by means of water, and avoid altogether the use of bromide. When a restrainer is necessary use citrate of borax. Begin development slowly, and strengthen the solution as the image grows. The fixing, washing and subsequent processes differ, of course, in no way from those usually employed; but in ton-

ing and mounting snow scenes, there is much room for the display of taste.

Do not tone a winter picture to a warm brown and mount on a chocolate or similarly tinted card. Let the toning be carried to cold blacks and whites, and mount on white or pearl card boards. Bromide paper yields peculiarly appropriate effects from winter negatives, and the platinotype may also be employed with good effect. Ferro prussiate or "blue" paper is also suitable for this class of prints, and, when worked upon with the colors harmonizing with the appropriate blues and whites of the cyanotype, it is surprising how much art feeling can be given an ordinary blue print of a winter landscape. This additional work with pencil or brush must not be overdone, the slightest touches here and there being all that is necessary to bring out an effective result. Any one who has sufficient taste will be found to possess the necessary skill to do all the retouching on a blue print that is required. These may be mounted on larger sheets of heavier paper, leaving broad white margins as in the case of water colors. Frame with simple light wood moulding, or preserve in portfolios or albums. Your collection of snow scenes will not be among the least interesting or attractive of the fruits of your camera.

W. I. Lincoln Adams.

SOME OF THE DIFFICULT THINGS TO PHOTOGRAPH.

There are many objects that cannot be satisfactorily photographed by the ordinary methods and apparatus of an amateur; some views are beyond the reach of our lenses, others are in dark valleys or ravines that cannot be lighted, and others have objects whose surfaces absorb nearly all the rays of light that fall upon them and reflect but few. A tripod cameraist might make a long exposure and get some dim picture from some such scenes, but in these days of Kodaks, Henry Clays, and snap shots, a thinking operator would not attempt to catch them on the sensitive plate.

There are still other scenes in which the difficulty is not so apparent, and the discovery of a failure is not made until the development of the latent image reveals that fact. For example, I once made an exposure, the subject was an old

gentleman, full length figure, he had white hair, and I posed him in front of a large white door; the result was a picture which causes me to smile at my thoughtlessness every time I look at it. The body and features came out all right, but I could not tell where the top of his head was, the snowy white hair blended with the white background so beautifully that there was no outline whatever; it is impossible to tell what is head, and what is door. I won't try that again, I assure you, for I have that marked down in my memory as lesson drawn from failure No. 1,100, or thereabouts. With this experience I was caught again early this spring.

Noticing a peculiar odd object protruding from the top of our city water-works standpipe. Though a mile distant I had no trouble to determine its character. During the severe winter the water had frozen all around the inside of the iron standpipe, forming an ice tube, perhaps a foot or more in thickness. The sun's heat had expanded the iron standpipe and loosened this ice lining, and it being of a less specific gravity than the water, it floated and raised above the tank some eight or ten feet. I took my hand camera and made a shot at it, thinking to have some slight outline of it above the huge red tank. In developing I found I was caught again; lesson No. 1,101. There was not a thing to be seen on the top of the standpipe, all was blank sky; there was scarcely any difference between the light reflected from the ice and that from the sky, that it showed as one in the negative, and like the old gent's head and door there was no differentiation.

Some months ago I made three snap shots at the sun point blank; these were made at sunrise, the ground was covered with snow and the light was fairly good; my object was to show an amateur friend that he was not developing his negatives far enough.

The first negative developed was stopped when the sun showed distinctly as a black spot with its surrounding halo, the other objects in the view were only dimly seen, the sky and snow was very thin.

The next one developed was carried as far as possible without losing the sun and halo; still the sky and snow was too thin and would print dark. The last negative was developed for the sky and snow to have proper value; this negative gave no sign of sun spot nor halo, but gave good printing value to sky and snow and the houses and trees in the view. In developing these negatives I might have resorted to a little

dodging and doctoring, and gotten a fair compromise between the objects, but as this was not my purpose I did not resort to it. These negatives and prints proved my position and filled the purpose I had in view in making them.

I have mentioned the last operations as something requiring more than ordinary skill to manipulate successfully, and we meet many such in our search for views. Take, for instance, a shaded lake; the surroundings are composed of a dense foliage, the centre is brilliant and reflects a great amount of light, whilst all around is dark shade; unless some expert dodging is done a good picture is impossible; there will be no details in the shadows if we develop to suit the ripple on the water, and if we do not do so, we will have a blank white space as our foreground and only a poor detail in the shady portions. These are a few only of the difficulties encountered by the amateur photographer.

Thos. J. Bray.

HOW TO MAKE A PRETTY SOUVENIR.

Amateurs frequently have sets of pictures which are especially interesting together.

They make a pleasing souvenir, either to keep for our own enjoyment, or to present to friends.

Mounted on ordinary cards, pictures are easily separated; and albums do not answer every requirement.

A pretty way of arranging them is this:

Procure several sheets of thin card-board of some delicate tint.

Windsor Bristol board, I have found a good quality. It is best not to have too highly glazed a surface because of the difficulty in handling it.

If you make your purchase in a store where large cutters are in use, you can have the sheets cut smoothly into small pieces of any size you prefer. And this size should be decided on in accordance with the pictures to be used.

For cabinet and small kodak prints, I have found 6 inches by 9 convenient. A page cut this size will hold one cabinet or two number one kodak prints.

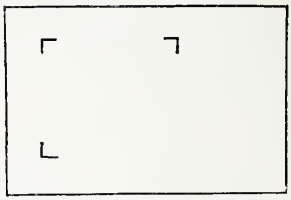
Now decide on the prints to be used.

Have them neatly trimmed, dry, and if possible burnished.

The faces must be kept perfectly dry and clean.

With pencil, mark the exact part of the page on which the picture is to be mounted.

Allow a wider margin at the left in order to fasten the pages together.



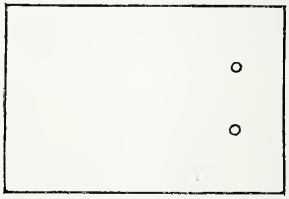
Use a gelatine mounting solution, which you must keep hot over a lamp flame.

It is not an easy way to mount pictures, but by following the directions which come with the mountant carefully, you will probably, after a little practice, succeed.

For a cover a page exactly like the inside ones is used.

Neatly letter some appropriate name such as "Home Scenes," "Here and There in Lakewood," "Nantucket Waves," "Boston, '94." Anything appropriate to the views collected. And if you have some skill in the use of water colors, you can easily make your cover quite attractive with some simple, ornamental design.

Now in each page, about an inch from the left-hand side and two inches apart, make two holes, thus—



A leather punch is convenient for making the holes.

Arrange the pages as you wish them to be, letting the holes fit one above another.

Have three-quarters of a yard of soft ribbon an inch wide. Pass the ends through the holes upward and tie them in a handsome knot on the cover.

The result I think will please you.

M. S. Turner.

THE ROMBOUT HOUSE.

"Souvenez vous, mes élèves, savoir dessiner n'est que savoir voir. Pour chaque minute que vous regardez votre carton, il faut en regarder cinq la modele."

This, of course, from the art student fresh from his Paris atelier. There is always one or more in every camera club; he has always bought his machines to get correct outline and to use the prints for memory work in his studio later. He despises photography at first, but, at last, unless he falls in love in spite of his prejudices, realizes that to take a good picture one must do a little more than just look at it. Well, we had one with us this pleasant morning, and one was enough. However, we bore with him and, in this last instance, took his advice, feeling sure he would need ours when we had left the field of action and withdrawn into our dark-rooms. Moreover the Teller House at Fishkill is worth looking at all of five minutes. It is nearly two hundred years old, and is famous as a historic landmark even before the Revolution. It is known to antiquarians as the Rombout mansion, as it stands on the Rombout lands—lands granted to the family of that name in the time of James II. It was originally an immense tract embracing eighty-five thousand acres, for which the patentees were required to pay to the government six bushels of wheat per annum. The Indians round about Fishkill, it seems, were

of a peaceable sort, perhaps, because, here their priests were said to live, and no injustice was ever practised in the sale or transfer of their hunting grounds. Our historian told us this. He has a camera, which he uses like a note-book, and if he takes no prizes for his finished prints it is only because he rarely finishes them.

"Were you ever so happy in your life?" I asked in a general way, looking complacently around at our company who with tripod and hand camera one and all were pointing at the scolloped cedar shingles of the sloping roof. It was a perfect morning; nobody had forgotten anything he needed, and, better still, nobody remembered anything he wanted to forget, so outwardly and inwardly we were in fair condition, yet my remark was not applauded.

"Is this your happiest day?" asked the Society member. "Poor girl; what a dismal life you must have led up to date." Fa-de-la wanted more of the "five hundred," I suppose, or a new heaven and a new earth, but this old one is good enough for me. I told him this, and, then, we amiably left personalities and modern times to go back to our work, while I handsomely confess that Fa-de-la's negative was the best in the Club; so maybe it is better to be unsatisfied. I steal my outlines from his print in the little sketch given here, for, after all, why is it his? We all looked, all took, and if the light acted better on his plate than on mine, was the sunlight or the luck his rather than mine? Next came that absurd stumbling procession of view-camera bearers, some with focus-cloth covered heads, some with stooping burden-bent backs, and if there was one point left unvisited it was nobody's fault. Indeed, the old homestead presents so many points of interest one does well to look before he takes, and when we went inside at the invitation of a small maid who "never heard whose house it was, but knew it rented very low," we wished for time or flash-lights to do justice to the elegant carvings, the rosewood panelings and ebony finish, not to mention the quaint Dutch oven and wide fire-places.

Who reads a guide book, I wonder, before visiting a show place. I for one wait till I get home, and therefore it was not till my plates were drying in the rack, some good, some bad, and some neither good nor bad, that I read up the subject. I wish I had known it all earlier, for then, could I not only have dazzled the Club to the extent of fogging their plates with my brilliancy, but I might have more thoroughly enjoyed the inwardness of past happenings. Here lived Madame

Brett, the only daughter and sole heiress of Roger Rombout, a New York Alderman. She seems to have been a woman of affairs, and to have been known chiefly because of her grist mill. We did not find it, unfortunately, so have nothing but musty chronicles to tell of it. It was famous in its day, as sign boards read "*From Wiccopee to Madame Brett's Mill*," "*From Hackensack to Madame Brett's Mill*," and so on. I have written a book myself, but no sign boards mark the dusty distances away from or toward me. Hereafter, if you wish to be remembered, grind, grind slowly, if you will, but grind small. Madame Brett did.

As a minor matter, I may mention in passing that Washington passed this way, and Baron Steuben and Lafayette and General Knox and Captain Shaw, not to mention Herr Schenck, Depeysters, Livingstons, Verplancks and Brinckerhoffs galore. Here they drank out of pewter mugs on week days and silver tankards for best, read prayers in low Dutch, planned war campaigns and made after-dinner speeches. I wish I could develop them out of nothingness, but, no, they refuse to be blue-printed and I do not blame them.

Adelaide Skeel.

STEREOSCOPIC VIEWS.

There is, to my notion, no prettier way to show a choice view or a successful group than through the stereoscope; the "plastic" effect thus obtained lends a charm to even a commonplace bit of scenery, that cannot be had by any other means. In hunting through art stores for stereoscopic views I found almost always the same answer: "We have no call for them, they are out of date"; and it was by no mere chance that I obtained a really good stereoscope, which was sold to me at much less than cost price. Why the popular taste for the stereoscope should have so nearly died out, I am unable to say. I am sure that all those who have ever successfully tried the making of stereoscopic views will agree with me in the above remarks.

Any 5 x 8 camera having a wide enough front opening, can with little trouble, be transformed into a stereoscopic camera; almost any journal or photographic paper gives instructions how it may be done.

In making an exposure for a stereoscopic view on a 5 x 8 plate, as is generally used, it should be taken into consideration

that a good part of the same must necessarily be cut off in order to conform to the size adopted for the stereoscope, and it is therefore well to always bear this in mind and leave plenty of "lee-way." The lenses are generally mounted about 3 inches apart, and in purchasing a set, the buyer should be thoroughly satisfied that they are accurately "matched." I want to say here that, after trying several makes, I have finally adopted the "Waterbury," which, by the way, are the cheapest to be had. In my experience I have found no lenses for this kind of work that will excel the "Waterbury" for outdoor views and groups. The modes of exposure, development, etc., are too well known and understood, and I will not refer to them any more than to say that the time of exposure must be exactly the same for both lenses, which can easily be regulated by a double shutter; cap exposures are not reliable.

The stereoscopic negative having been secured, the question arises as to the best mode of printing from the same, and this is the principal object of my paper. As is well known, the prints in mounting have to be reversed, and it is very bothersome to always get the right ones on the same mount, and in proper order. To overcome this difficulty, it is advised to reverse the negative and print both views on one sheet, and at the same time. I shall try to describe as clearly as possible my way of doing this; I claim no originality, but the success I have had, prompts me to describe the same. The division in the camera produces a clear strip between the two views—generally about $\frac{1}{4}$-inch wide. I place my negative, film down, on a blotter, and with a glazier's diamond cut the negative in two, through the center of the clear strip, leaving one-half of the same on each, which, when mounting the negatives, would form the outer edge, and thus be a guide in case of a doubt as to "right and left." Now draw on the blotter three parallel straight lines $2\frac{7}{8}$ inches apart, and about 7 inches long, and call them 1, 2 and 3, and through the same draw cross lines at right angles 5 inches apart, naming these A and B. Place the left negative (having the above mentioned half of clear strip on the left side) over the left oblong, formed by lines 1, 2, A and B, the two latter forming a guide for the edge of the plate; placing the negative so that the lines 1 and 2 will form the edge of the finished view. Now cut off very accurately the strip projecting beyond the line 2. Then place the right negative in its place over the oblong formed by lines 2, 3, A and B, similar to the former operation. Then carefully replace the left negative in its old place—its right edge form-

ing line 2, and overlapping the left edge of the other half (right) negative. Here lies the secret of success—the right negative must occupy exactly the relative position over its oblong as the left one did; for example, the objects on the right half near the line 2 must correspond to those near line 1 of the left half. Holding the left half firmly in its place, the right one is slid into its proper position, and the former operation repeated, cutting off the strip projecting beyond line 2. I need hardly add that all this is done with the film side down. The two halves are now ready to be mounted on a glass—I use old 5 x 8 plates for this purpose; first carefully cleaning both negatives and glass. Many ways are recommended for mounting. I find a minute quantity of Page's glue put on top and bottom of the negatives very practical; it sets quickly and is always ready for use. Care should be taken that the glue does not spread, or it will show in the print. Of course, the inner edges of the two half negatives must "butt" together. When dry, the negative is ready for printing, but should be matted out, as the central line is more or less ragged. The mats, which may be pasted on the film, are cut out of ruby paper, and can be made with arch tops or square, as desired. I generally leave a strip of about $\frac{1}{8}$-inch to cover the center cut, and then trim the paper to have the same white margin all around.

It may seem a great bother and trouble to prepare the negatives in this way, but I would advise one trial, and hope the result will be as gratifying as it has been to me.

Emil de Neuf.

VIGNETTING FOR LANDSCAPES.

Photographers sometimes express regret that their lenses cannot focus at the same time and with equal sharpness upon objects in the foreground and in the background. They forget that the lenses of their own eyes are subject to the same limitation.

Artists criticise the precision with which photographers reproduce the minutiæ, the accidental details of a scene, if they happen to be at the same distance from the lens as the chief subject. For instance, a photograph is made of a horse in a pasture. The horse is the chief object in the picture. He is in the foreground, and is in focus. But the stump beside him, or the white-weed blossoms at his feet, are equally in focus,

and to this extent they are given greater importance in the picture than they merit, and hence serve to detract attention from the chief feature of the view. The hillside in the distance is out of focus, but so it is if one is merely looking at the horse from the position of the camera, and in this respect the camera represents nature as we see it. If the spectator looks from the horse to the hills in the background the focus of his eyes changes and a new picture is produced on the retinas of his eyes. As they are two views when looked at with the eyes, it is fair that they should be separated in photographing.

It may be pleasant for the sake of association to represent a party of our friends in a carriage in the immediate foreground of our picture, and a familiar landscape in the distance, by "splitting the difference" in focusing, or it may be economical to make one plate serve for both, but it is not artistic.

A good rule is this: make up your mind at the outset what the chief "motive" of the picture shall be and subordinate everything else to it. If the picture is to be a landscape, remove the carriage at least fifty yards from the camera; if it is to be a picture of the carriage and people, subordinate the landscape by vignetting or masking. Don't overload a picture; don't let it suggest a scrap-book.

This brings us to the subject of vignetting. Portrait artists should not be given a monopoly of this means of treatment for photographs. Very many—I am not sure but most—views of scenery, buildings and the thousand and one objects of the photographer's efforts can be most effectively and artistically represented by vignetting. Our eyes (unless we are afflicted by strabismus) can look in only one direction at once. In whatever direction we are looking we see, without turning our eyes, everything within a range of considerably more than 100 degrees; but in the edges of this picture things are indistinct. Vignetting restores to the picture the gradual indistinctness in the edges which is apparent to the eyes. It may be said that a photograph should be a copy of the scene in all its parts, over which the eyes may roam, looking now at this corner and now at that. This would be true if the picture was intended to serve as evidence in a law court, but with many subjects it is not true from an artistic standpoint.

In any case where the background is badly out of focus, or where it is too prominently in focus and includes things foreign to the main idea of the picture, vignetting is the proper treatment.

The ordinary means of vignetting involves some labor in the case of pictures of odd sizes or shapes. With bromide paper, however, where the printing process is ordinarily a matter of seconds, it is very simple. A piece of paper is cut in any desired shape for a mask, the opening being smaller, of course, than the extreme dimensions desired for the shaded portion of the picture, and while the exposure is being made the mask is kept constantly in motion close to the printing frame.

Samuel Merrill.

THREE TESTED FORMULAS.

Developer for any Brand of Plates.

Eikonogen	1	ounce
Sodium sulphite	4	ounces
if granulated	2½	
Potassium carb	1	ounce
Water	64	ounces

Shake thoroughly for ten minutes; filter in twelve hours, or when all is dissolved.

With normal exposure, dilute, half water. Short exposure, full strength. Will keep any length of time in amber-colored bottle.

Vignetting Paste.

If you want vignetting paste, save money and use Venice red. Mix with little oil and turpentine; when ready to use, thin with dryer and turpentine to suit.

Best American Aristo Toning Bath Solutions. Pure Whites. Any Tone Desired.

Stock Solution No. 1.

Water	64	ounces
Acetate of soda	1½	ounce
Common salt	3	ounces
Gold	4	grains

No. 2.

Water	1	ounce
Gold	15	grains

Toning Bath.

No. 1	4	ounces
No. 2	½	ounce
Water	64	ounces

Pin-hole Preventive.

Dust plate-holder each morning. Keep plates out of dust. Filter thoroughly all solutions. Try above and see how pin-holes will vanish.

J. H. Reuvers.

MONOCHROME OIL-FINISHED BROMIDES.

The method described has been in use by me since the advent of the Eastman paper, and has been found in every way satisfactory.

To prepare the color for a black or crayon finish: Take one part of megilp to two parts of blue black, ordinary tube colors, mix these well with the palette knife. Now with a *bristle* brush, flat, rub in the shadows, in a similar manner to stump work in crayon, using but little color, as a rule. Now with another bristle brush, round, proceed to even and blend the color by stippling, which is light strokes with the end of the brush perpendicular to the surface of the print. For a fine stipple tap lightly; for a strong open grain give a stronger stroke. After blending in this way some parts may be found too light; apply more color, using it in the same manner as with the stipple brush. If not sufficiently blended follow with the stippling brush. For finer markings about the eyes, nose, mouth and ears, use a smaller brush, a sable if preferred; but to keep the work in harmony finish by stippling, using a size suitable to the work to do. The hair and beard are rendered much more effectively with a brush than by any other tool, besides in much less time.

In working the hair or beard use the color somewhat thinner, reducing with a little poppy oil. Use always as large brushes as possible, as it is easier to keep the work broad and effective. I have used crayons and the air brush, and can safely say that the effects obtained as described are superior to either, besides at a great saving of labor and time.

For sepia tones, use a mixture of sepia and raw umber in proportion to match the tone of the print, of course adding the megilp also.

Over the enamel bromide print the color dries so nearly the same gloss that it is not necessary to cover the whole print.

Finish at one sitting if possible, and never use any white unless to strengthen extreme high lights. Depend altogether on the transparency of the color for light and shade. Wiping out and hatch effects are produced as freely as in crayon, using a soft cotton cloth over a cork stump. It may seem complicated to some who may read this, but I assure you it is more simple every way than crayon, even a novice being able to produce quite creditable results, because the color being semi-transparent there is always the drawing of the print in sight for a guide.

L. G. Bigelow.

PRINTING, TONING AND MOUNTING.

So MANY articles have been written upon these three subjects, that there is little left to tell, but trusting that there may be some person who has recently purchased a camera, and who, by some good fortune, may chance to see this ANNUAL, I venture to tell of my way of doing these three things.

After four years of experimenting, the conclusion has been formed in my mind, that printing under a clear sky, and not in the direct sun, gives a better color when toned, even for dense negatives for which it may take thirty minutes or more to transfer the image to the paper.

For land and sea scapes the mat surface and platinum paper give a beautiful effect, producing a picture between an etching and an engraving. But if one desires a highly polished surface, the Bradfish & Pierce Aristotype paper has, as yet, no superior. As I have used it a great many times, and as it is a general favorite, this article will be upon its manipulation. In the first place, be careful when raising the paper from the negative, while partly held by the back of the printing frame, that it does not crack, something which is liable to happen, particularly if the paper is not very fresh, and if it does, it will certainly show when finished. Before removing from the frame, be sure that the print has at least one coat of color more than will be desired when finished, for repeated washings, and the toning always lighten it. After printing, and being ready to tone, procure a clean dish (I have found china to be preferable), and filling it with water, lay the prints in it, one by one, face down, allowing each to become saturated before placing the next. After they have soaked fifteen minutes, changing the water six times at least, during that time, place them one by one, face up, that you may see that each is completely covered by the toning solution, of which Dr. Ehrmann's formula for combined toning and fixing is as good as any, if not better.

When they are all in the solution (and it is better not to tone more than one dozen at one time), turn them face down, and constantly remove the under one placing it on top (but first be sure that your fingers are perfectly clean), looking at them frequently to see whether you have the desired tone. As they always turn yellow before brown or purple, do not think there is something wrong with the solution, and remove them too soon, but wait patiently, and you will get a more

pleasing color; on the other hand, do not delay it too long, or they will lose all character and be of a dirty gray.

When each has reached the desired state, remove it to clean water until you have them all together. From this time, unless you have the running water, the water must be changed often, and a very satisfactory way is to have two dishes side by side filled with water; removing one print at a time lay it face up on a sheet of glass, and with a wad of absorbent cotton, wipe the surface before putting it in the fresh water; often the cotton will be found to be much discolored, especially from a dark print.

In changing them for the third or fourth time repeat this process, and if the cotton remains clean you can feel quite sure that there is little or no hypo left to stain it. Credit should be paid where it is due, and, therefore, I wish to thank "Captain" Abney, who first mentioned this process in *The Photographic Times* several years ago. All this process sounds like a great deal of trouble, but a good motto to have always in your mind is that "the best way is as good as any." After changing the water eight or ten times, lay them face down separately on a wet lacquered or japanned tin, and squeegee them to remove all air and water, stand on edge to drain, then lay where the wind will draw across them, and they will dry more slowly but strip more easily than if placed near the heat. Several times the question has been asked, "Why do my prints adhere to the tin?" In answer to that question, let me say that my experience has taught me that the heat melts the emulsion, and it clings to the tin in an exasperating way, and several of my tin sheets had to be sacrificed before I had learned the lesson, "to make haste slowly."

Would that some inventive genius could give us some way of mounting the aristotype without using paste, for it seems almost impossible to paste on the back without smearing the face of the picture, but though the paste can be removed by alcohol, not water, still it is not an interesting piece of work. The only other way is to sacrifice the gloss, and after floating in water, and mounting on the card, to pass it through the burnisher.

Now I have a little secret that I want to divulge (for they say a woman can never keep a secret) for the benefit of my fellow amateurs, who may have been tried as I have, by finding yellow spots on the pictures, left by the hypo not having been thoroughly eliminated, or when the print has come in contact with some of the deposit in the toning dish. Cheer up, friends,

C. D. Arnold, Photo. *Copyrighted.*

A GLIMPSE OF THE WORLD'S FAIR.

they can be removed by a little strength and patience. If the picture is mounted, so much the better, if not, hold it carefully on a flat, hard surface, and with a piece of muslin over the forefinger, dipped in alcohol, begin to rub the spot, not always up and down, but in every way, and gradually it will disappear. If it has been of recent toning, the alcohol will remove it quickly, but if it is an old stain it will go finally, but it will require patience. Above all things avoid rubbing a hole in the paper.

In regard to mounting, there are many ways in which simple photographs may be made a very artistic Christmas present, or souvenir of some driving or yachting trip, tennis party or summer outing, which will, in after years, recall "the good times we had long ago." It would, perhaps, be well to leave it to the taste of the photographer, but a few suggestions may be a help to some one. Get from the wall paper manufacturers some cartridge paper of different colors, take a piece an inch or more larger either way than the photograph, and tearing the edge, so as to have it rough, cut four slits and slip the corners in. If using the same paper for a cover, cut the picture in some geometrical form, place it at one side, and letter the title with gold or silver paint. Or for small pictures use two-inch ribbon, on which fasten the picture with a little paste at either corner, and on one drop some sealing wax, and stamp it with your seal; fasten half a dozen or more together at the upper left hand corner with a silk cord or narrow bow, and keep in a stiffened case.

C. L. Pierce.

AIDS TO ARTISTIC PHOTOGRAPHY.

It is well understood that the first consideration in selecting a photographic outfit is the lens. A poor lens is a fixed bar to success; a good one is an inspiration, as it is the product of genius, and is only fully appreciated by genius.

It is also a very well-known fact, that no one lens will do all kinds of work. He who aspires to artistic photography must provide himself with a set of lenses, differing in focal length, and even in light power where instantaneous effects are sought. Almost every authority recommends for out-door work the single combination lens, but the single lens usually gives very minute detail, and this of itself cannot be considered a quality of artistic excellence. Therefore, in its use the utmost

care must be exercised in the management of both stop and focus. This is no disparagement of the single combination lens; indeed I have seen some of the most artistic results secured with the Waterbury.

During the past year I have made a careful investigation of a large number of lenses, and have been very forcibly impressed with the excellence of this class of work, especially in America. I believe firmly in maintaining home productions, and I shall therefore mention two brands of American lenses which I regard as superior in every respect.

The first is the Perigraphic, manufactured by the Gundlach Optical Co., Rochester, N. Y. The 8 x 10 lens of this make has an equivalent focus of 8½ inches, and is the size best suited to the 6½ x 8½ plate. It consists of two non-symmetrical triplet combinations, applanatic, and working with great brilliancy and fine definition. The back combination has a focal length of 13½ inches, the front combination 18 inches; thus combining in one the equivalent of three lenses. These combinations used singly, being triplets, are practically rectilinear, and cover an 11 x 14 plate, so that in case one has an extension for the 6½ x 8½ camera, it is very possible with this lens to make pictures of superior artistic excellence. Every amateur who aspires to fine work should certainly possess one of these lenses.

Another lens of superior quality is the Anastigmat, manufactured by the Manhattan Optical Company, New York City. This firm, although among the latest to bid for favor, is putting forth a series of very superior lenses which are rapidly winning favor among the fraternity. They have one of the most complete plants in America. The Anastigmat works with great softness, is capable of wonderful artistic diffusion, and is the most rapid lens that I have tried. It is not only superior for landscape work, but also for portraiture; in this respect I think it far surpasses the ordinary rectilinear lens of the same grade, both in rapidity and softness of effect. The workmanship of these lenses is first class, the price is reasonable, and in fact I cannot too highly recommend them.

In landscape work, with the facilities now at hand, the photographer should aim at something like the etching effect. Even the chief object of interest should be softened, and the distance should never be allowed to detract from the significance of the picture. Indeed the distance should seldom have more than the faintest outlines. In this respect I should recommend as models the pictures of F. M. Sutcliffe, of Whitby, England.

After the work of the lens there still remains much to be done before the negative is complete. It is supposed that nothing but orthochromatic plates have been used, and that by them the light values have been measurably secured. Now artistic effect may be very much heightened by the judicious use of the knife, the pencil, the brush and the crayon. Spurr's case of pigments should always be at hand, not only for spotting out the finished print, but also for work on the negative. After all has been done that can be effected by knife and pencil on the face of the negative, cepa paper may be pasted on the back or glass side, and crayon applied to lighten the shadows, to strengthen the high lights, and to work in certain effects that will add to the balance and harmony of the picture. Here the amateur, who often has some art training, and who has plenty of time, ought to excel. Even if it takes weeks to produce one satisfactory result, it is time well spent, both in the cultivation of taste and the pleasure afforded by the completed work.

Very often the artistic print is a matter of selection from the negative. Frequently the larger part of the plate must be rejected, the picture being confined to a small area. I have found it a good plan to set the plate in a large window, and then with pieces of cardboard obscure all but the part that seems the most telling. Now give a day to the judging of the picture. Observe it as you pass through the room. Change the pieces of cardboard about from time to time, and note the effects. I have no doubt it will be found that many negatives have too much foreground and too little sky. When you have settled on the part from which the print is to be made, cut out a piece of needle paper to correspond with it, and large enough to cover the entire negative. Thus you will have a cut-out to guide the printing, without injuring the plate.

The use of the vignette will often prove of great service in modifying the border line and softening objectionable features of the picture. Every amateur should study the artistic use of the vignette, and it should be frequently employed. The use of thin sheet lead will be found very serviceable for these masks. It can be easily bent to any shape required, and may be fastened in place by little clamps to be purchased at any stock house.

Ready prepared paper for artistic printing is now easily procurable, and this of almost every desirable variety. This is fortunate because no one kind of paper will do for all negatives. Carbon will perhaps adapt itself to the largest variety

of results; next comes platinum, and after that bromide and mat surface gelatine papers. No prints are more pleasing than those made on mat and rough surface papers, and the possibilities in this direction are only just beginning to be appreciated.

A very artistic print may be made on rough drawing paper by salting with a solution of 60 grains of chloride of ammonium to 10 ounces of water in which 120 grains of gelatine has been dissolved. This paper is now sensitized with a bath of silver, 60 grains; citric acid, 15 grains; water, 1 ounce; and toned with chloro-platinite of potassium, 1 grain to the drachm of water, added to 4 ounces of water with 1 drop of nitric acid.

With aids like the above ready to our hand, art in photography is coming to be a possibility. Thoroughly trained in art principle, the photographer should soon place before the public unique results.

John H. Bates.

OF A CERTAIN DARK-ROOM.

So MUCH has been said and written of dark-rooms, their apparatus, furniture, mode of lighting, etc., and it is a subject that has been so thoroughly and ably discussed, that whatever I am able to contribute may be of doubtful value, but I have in mind a room that was so neatly and splendidly equipped, that perhaps a few of its good points of construction may not come amiss.

About the first thing an amateur who expects to do his own developing looks about for, is a place to be converted most readily to the uses of a dark-room, and this he usually finds either in a good closet or a bath room. But in case he is so situated as to have the nook or corner of a cellar that is well cemented and dry at his disposal, he may indeed consider himself fortunate, for here he can construct not only a room that answers to all purposes, but one that will be quite free from intrusions and out of the way.

The room of which I am about to speak was one constructed in such a place. A corner was selected which, by placing shelving at the two open sides, was made into an enclosure about 8 feet square. Through one of these partitions was made an entrance in the shape of an ordinary door on

hinges. Leaving, therefore, these two sides with shelving, upon which were stored negatives, trays, chemicals, and accessories of all kinds, we will turn to the other two. Nearly the entire third side was taken up by a fuming and drying box, constructed in the ordinary manner, lined with building paper, and practically air-tight, the heat for drying being conducted from a lamp through a tin tube, which could be opened and closed at will. On the fourth side, running the entire length, was a counter, waist high and about 2 feet wide. In just the center of this was placed an iron basin about 3 feet long and 6 inches deep, supplied with a waste pipe, connecting through the floor with the sewer.

A water-pipe was found to which a connection was made, and thereby obtained that most necessary essential of successful photography, plenty of good water. On the left of the basin was built a zinc tank resting on the counter and about 2 feet long and 18 inches deep. A rubber hose connecting a spout at the *lower* side of this tank with the water tap gave plenty of water, which was again conducted through a pipe at the top of the tank into the basin, and thus into the sewer. This tank, which could thus be constantly supplied with a change of water, was used both for washing negatives and prints, care being taken to always have it clean. Immediately above the basin was built a box about 2½ by 4 feet in size, and about 10 inches deep. In this box was brought a short gas-jet, while just outside the box and to the right was another jet, both supplied from the same source.

And to this little box is due the satisfactory development of a great many negatives, that without it would have been hopelessly lost. For here I think I found the best method of adjusting the light that I have yet seen.

The front of the box is fitted with four frames, each 2½ by 2 feet, that slide readily to and fro upon little grooves. One-half the face of the box is then covered solidly with wood and cloth to insure of its being perfectly light-tight, In the frames described, and in the order of the one nearest the gas-jet first, are put a ground-glass, an ordinary ruby glass, a glass covered with post-office paper, and the last one with ruby paper.

The gas is then lit, the ground-glass slid over to diffuse the light and then may be chosen any of the others, or a combination, according to the subject in hand, while the strength of the light may be regulated by the key from without. In the absence of gas I think a box so constructed and a lamp placed

inside would answer every purpose of this one, and is quite readily made.

Just in front of this box and over the basin the owner of this room was fortunate enough to have a small incandescent electric lamp of about 16 candle-power, which very well answers for the exposure of bromides and kindred emulsions.

Of course baths, racks, etc., were not wanting here, and altogether I have yet to find a room better suited to the wants and wishes of the modern amateur photographer than this one.

W. C. Koehnle.

SILVERING ALBUMEN PAPER.

Blessed be those amateurs who are able to surround themselves with all the conveniences for doing their work.

There are many, to my certain knowledge, who are trying to enjoy the art, upon a small capital, who can ill afford luxuries. To such ingenuity must suggest a substitute for many of these conveniences. The writer, after four years' experience, has never yet made use of a dark-room. How is it done? Patience and nature, if seized upon in the right way, supply the needs.

After dark and the maid of the culinary department has subsided, the kitchen work table will be just the place for developing.

Likewise silvering of albumen paper can be done any hour after dark.

Remembering how sorely puzzled I was when first attempting this branch and how dim was all the information obtained, either oral or written, I venture to place more plainly before the younger readers of the Annual a method which is at least simple, and I trust will be of some use to many beginners.

First, the preparation of your silver solution requires your attention. Procure 2 ounces of nitrate of silver crystals, and dissolve it in about four ounces of any pure water, not well water. Into a wide-mouthed pint bottle, like a gherkin bottle, pour half of this solution and nearly fill it with water (lacking only an ounce or so).

Test with hydrometer. If below forty add a trifle more solution. If above fifty add more water. Thirty to thirty-five degrees will work better in warm weather.

If not the possessor of a hydrometer, any druggist will test it for you.

For your tray, saw from an inch board a strip 3 inches wide, dress it, and one-half inch from one side, with buzz saw cut a rabbet one-eighth inch wide and one quarter inch deep, and mitre it together with a piece of glass set in for the bottom. A convenient size for a half sheet for $6\frac{1}{2} \times 8\frac{3}{4}$ or $4\frac{1}{4} \times 6\frac{1}{2}$ prints is 11 inches wide and 25 inches long, inside measurement.

After it is glued together putty in the glass on the under side, the same as you would a window glass, and on the upper side fill in any cracks left with putty and give two coats of heavy body varnish. It will be better to oil it before varnishing. Half sheets are easier handled and cut very economically if cut lengthwise. At one end of the tray, just inside, fix two screw eyes large enough to hold a quarter or a three-eighth inch glass rod. This is stock and utensils.

Now we will silver some paper. Cut your albumen paper lengthwise into two equal parts. Place them, coated side down in a pile on some clean soft white or manilla paper on a table; cover with four or five thicknesses of newspaper, and over all place a water soaked towel wrung partly dry for twenty or thirty minutes. This limps the paper and prevents, to a large extent, the curling up, as well as softens the albumen to receive the silver more quickly and evenly.

In the meantime get out your tray and set it level; fix your glass rod in the screw-eyes, and prepare some clips by slitting some one inch square pieces of old mounts or card-board. Put up a line upon which to hang your sensitized paper, and exclude all light save that of a mild kerosene lamp.

In placing paper in bath, seize it by the ends furthest apart, albumenized side downward, and drop it so that the middle will reach the bath first, and gradually but quickly lower the hands until all is down.

By means of your fingers, or some light sticks about the size of lead pencils, stand ready to hold down the edges if they curl up. In a few seconds the paper will flatten, then from each end raise the sheet to the middle, and with a sharp-pointed smooth stick troll out any air-bubbles found. After this gently touch the sheet, as it lies, from center outward to force out any unseen bubbles still left. In summer 80 seconds and winter 100 seconds is long enough to float the paper. To take it out grasp one end with the finger and placing it on the glass rod gently draw it over the rod to clear off surplus solution, and after clearing the rod double it lengthwise, coated side out, and fasten it on your line, with clips, to dry. From

three to four more clips slipped on along the edges will keep it from curling as it dries.

Clean up your tray and put away your utensils. If the silver solution gets discolored add one-half teaspoonful French chalk, shake and set out in sun for ten hours or so, and have it ready for the next time. If it weakens add a little more of the original solution to bring it up to 35 or 40 degrees.

In half an hour the paper will be ready to lay away in some box, drawer, or closet where it is fairly dark. In the morning fumigate your paper and use it.

A fumigator can be easily and quickly made out of a wooden box of any size you like. Upon opposite insides of the box place a row of tacks 2 inches from top and 2 inches apart, and run common string across and back from tack to tack, for one shelf, and as many more below as you like, but leave at least 6 inches space at bottom for ammonia dish. Batton the lid and fasten with a string from a tack in the lid to one on side of the box, on both sides of the box. Paste up with paper any cracks in the box. Cut up your sensitized paper to sizes wanted and place on the string shelves and fume it 20 to 30 minutes. For two sheets one-half a gill of strong ammonia with as much hot water added and placed in box promptly will do the work effectually. It will be well to throw some blanket or piece of carpet over the box for the first few moments.

With these directions I am sure any novice can do the work well, and once you learn to silver your own paper, you will save at least one-half its cost, and be put to no expense or annoyance. Albumen paper can be bought in any quantity, and if kept in a dark place will last indefinitely, and always be ready to hand.

W. B. Dimon.

ON THE PHOTOGRAPHIC SEARCH FOR ASTEROIDS.

From the dawn of history the planets Mercury, Venus, Mars, Jupiter and Saturn were known, and as they, together with the Earth and Sun, reached the sacred number seven, the tale was thought to be complete, and only Kepler dared to suggest that between Mars and Jupiter there might be another planet whose smallness prevented it from being seen. So the matter stood till the evening of March 13, 1781, when Sir William Herschel, in gazing through his telescope at some

small stars in the neighborhood of H. Geminorum, had his attention attracted by one of them which seemed sensibly larger than those around it. After a careful examination he concluded it was a comet, and about three months elapsed before it was recognized that a new planet, now known as Uranus, had been added to the solar system. This discovery served to vitalize Kepler's idea of the existence of a planet between Mars and Jupiter, and through the active efforts of De Zach an association of twenty-four astronomers was formed to search for it. The zodiac was divided into twenty-four equal parts and apportioned among them, but before they got fairly at work the first asteroid was found by the celebrated Italian astronomer Piazzi, who was not a member of the association. On January 1, 1801, in looking for a star which Wollaston had wrongly located in Taurus, he stumbled upon the minor planet Ceres. On March 28, 1802, Olbers found a second, which he named Pallas, and then, on account of the small size of these bodies, and the great inclination of their orbits to the plane of the ecliptic, Sir William Herschel proposed that instead of planets they should be called asteroids—a name which has since been universally adopted.

For reasons which it is not necessary to explain here, Olbers was led to suspect that these two asteroids might be portions of a larger planet which had been shattered to pieces, and in pursuance of that idea he proposed to search for other fragments. The result was the discovery of two more asteroids; Juno being found by Harding on September 1, 1804, and Vesta by Olbers on March 29, 1807. Then, notwithstanding the probability of many more such bodies, the discoveries ceased, mainly for want of suitable star-charts to facilitate the search. No systematic attempt was made to supply such charts till 1825, and no more asteroids were found until December 8, 1845. Then the discoveries began again, and since that date they have continued so uninterruptedly that now about 380 asteroids are known.

Until about five years ago all observations and discoveries of asteroids were made visually, and the first use of photography occurred under the following circumstances: In 1886, Mr. Bryant was anxious to get some recent observations of Sappho in order to compute an improved orbit of that asteroid, which had not been seen since 1872, except by Dr. Gill, who made some observations of it in 1882. As the planet was then in a part of the heavens studded with small stars, there

would probably have been great difficulty in finding it visually, and to avoid the delay incident to that method, on December 16, 1886, Mr. Bryant wrote to Mr. Isaac Roberts, the well-known English astronomer, and asked him to make a search for Sappho with his twenty-inch photographic telescope. The first question to be settled was how long the plates should be exposed, and as the planet was of the eleventh magnitude, with an orbital motion which in sixty minutes would give a trail four times as long as it was broad, Mr. Roberts concluded that that would be sufficient time. Accordingly, on December 30, 1886, he exposed his first plate for an hour, and had the satisfaction of finding the planet depicted upon it. Other plates were made on January 1 and 14, and on the latter no less than two thousand stars below the seventh magnitude were shown on each square degree of its surface! As the stars were fixed, their images were little round disks, while the planet, on account of its orbital motion, left a short trail which was easily recognized upon careful scrutiny. In publishing an account of these plates, Mr. Roberts remarked that by means of photography all known asteroids, and all that may exist, down to the fourteenth magnitude, could be discovered and charted by a single astronomer in two or three years. That hint has since been followed up by Charlois, Dr. Max Wolf, and others, so assiduously that the visual method of hunting for asteroids has now been almost wholly superseded by photography.

Wm. Harkness.

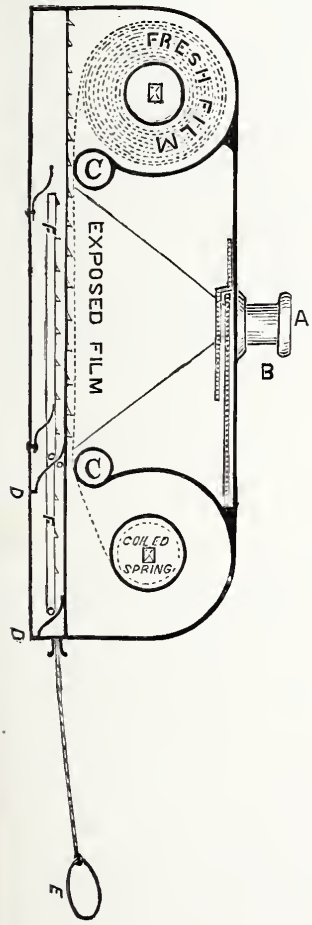
AMATEUR CAMERAS.

I HAVE been a camerist for so many years and interested in every form of photography or apparatus for its production, that my experiences go back to the times when apparatus was difficult to get, and, owing to the difficulties of construction, incomparably inferior to ordinary apparatus of the present time. Everything was bulky, clumsy and inconvenient, and I have rarely known any one deeply interested in photography who had not devised or constructed a camera on some plan of his own.

I have owned many, either purchased or made by my own hands, and still mourn the neglect to patent machines that were "just the thing," whereby I might have made little profit but had much pleasure.

When I first tinkered with Newton's emulsion, I straight-

way built a camera out of a cigar box, as a basis. Three compartments—one end loaded with a dozen plates. One plate was slid under the partition into the camera which was the middle compartment. After it was exposed it was slid into the third compartment, its place being simultaneously taken



A.—The lens.

B.—The shutter.

C-C.—The guide rolls.

D-D.—The carriage deflectors.

E.—The setting device.

F-F.—The carriage.

by plate number two. It worked fairly well experimentally, but my lens was too big and clumsy, and besides, the idea had been carried out very neatly in some forms of French portable cameras.

Next, I became the possessor of a revolving round plate camera—somebody's vest camera. That had the best lens, the best shutter on the best principle, and was really "concealed," so that soldiers on duty, dogs performing tricks, incidents on beaches, and scenes from Indian life and among Mexicans and Chinese were caught in the most natural and satisfactory way. But its one round plate, with capacity for six or eight silver dollar pictures, made its limitations exasperating, and I fitted on a new back which would hold two spools with bromide paper. It was English and not intended for this purpose. I cut strips from the sheet for the purpose of the experiment. It worked too slow. At that time Eastman's instantaneous paper or films had not been invented, or, at least, I knew nothing of them or their equivalents, and I had to let that experiment go, and go back to the use of round plates, changed under bed clothing, or sometimes in a bag.

I got some paper sent out from England, and then tried a three compartment arrangement again. About the time I got it to work and was making a second, nearly all of metal, after the fashion of the vest camera, in which the shutter was better designed, *The Photographic Times* had a description and suggestions involving the same general ideas (by Mr. Stillman, I think). Shortly afterwards I went to the Pacific Coast, where with no facilities for construction and with other interests to think of, I dropped the matter.

The camera was in three compartments, with the lens of the vest camera mounted on the center compartment, which was the camera proper. The others held the spools for unexposed and exposed films. In one compartment was a tin roller, like the rollers for roller shades (indeed it was made from one), to which the film was attached so that a constant tension was maintained on the strip of film, which extended across the bottom of the middle compartment, under both partitions, into the storage compartment and the supply roller. As a *matter of economy of film*, I proposed to attach to each end of the rolls an extension of muslin backed paper, which would also have served to produce a "light proof film cartridge."

This was to be a concealed camera, and I worked constantly on that line only; that it must be short focussed, therefore not too thick, so that it's presence inside coat or vest would not be readily discovered. The vest camera lens answered the purpose perfectly for small pictures, and I put off experiments on larger sizes until a later period.

The device of moving up a fresh surface for exposure worked

with paper, and would work better I think with the tougher celluloid films of the present day. My carrier was attached to a watch chain, suspender strap or other convenient pendant, so that a positive, definite, measured amount of prepared surface would be moved into place, when the spring roller would take up the slack and hold it there; then the retractor spring would send the carrier back to its place ready for another set of the film. This all worked very well, and in the hands of an expert like Flammang, the Scovill-Adams camera genius, it would be perfect in every way. The shutter was then a task, and I never got that completed to my satisfaction. The oscillating spring, which I saw afterwards on an English hand camera—and which the Bull's Eye now uses—would have served my purposes at that time, and doubtless have continued my interest. I don't know anything as good yet, though year by year patents are issued on parts, devices used in these experiments of ten to thirteen years ago, or by other amateurs who tinkered in the same direction.

J. W. MacMurray, U. S. A.

ORTHOCHROMATIC PLATES IN LANDSCAPE WORK.

It has long been a great wonder to me why so many of my brother amateurs are content to follow blindly in well-worn paths, not venturing a hair's breadth to right or left of that bar to pleasant surprise and new discovery, "the conventional."

I think the most pleasant and exhilarating sensation known is that experienced after a dive into the unknown, as it were, to find you are right side up and have opened up possibilities undreamt of before. The "unknown" in photography is a vast region, too vast for most of us to comprehend, and least of all visible from the "beaten path."

I was a stern, strong advocate of said *beaten path* till an accident opened my eyes. One day a year or more ago, when the clouds were particularly fine and the atmospheric effect more than usually conducive to perspective, I hurriedly filled a plate-holder to catch my favorite view. What was my disgust to find in my plate closet, only two plates, one an isochromatic and the other a 27x-plain; an amateur friend having stripped me clean of plates.

The isochromatic, I knew, had been on hand nearly a

year, but the 27x was fresh. I could not count on but the last-named, but by way of investigation, exposed both with Bausch & Lomb shutter, No. 2 euryscope, to same time, and developed with amidol at same time also. As I fill all holders in absolute and cimmerian darkness, I was sure of them as to fog, and while in pan they were snugly covered over. So far as possible the conditions up to fixing were identically the same.

The result was a surprise. The iso plate was by long odds the most perfect plate in technical and chemical form I ever made. Not a single cloud or distant detail was wanting, and, withal, that evanescent thing in photography called "aerial perspective" was there in great force. The 27x was a good negative, but by comparison was not in it. Before this I would have called it an A1 cliché.

I have no doubt that many of my amateur friends have been using the ortho-iso plates ever since they came out for landscape and *know all about it;* but I fancy there are many others who have never used them because they are not in the regular line. It is to these only I wish to call their attention. I am led to this belief because I find one of the largest "stock houses" in this State out of New York City always orders them especially for me, not keeping them in stock. As I use no others now it is apt to cause a delay which would not occur if there was a greater demand.

Anent the use, therefore, of ortho plates, I would certainly advise their trial by those who have not done so. They are very easy of manipulation; the only precaution, I think, is to fill plate-holders in the dark and do not uncover the developing pan till high lights are very plain. I have tried pyro, *hydro,* eiko, metol, rodinal and amidol as reducers, and though varying in time of reduction seem all to act well. I do not think the screen of any use except among autumn tints, as it prolongs exposure too much. I have many drop-shutter views, with them there is very little evidence of under-exposure, even when the plate was sold as slow. The amidol, rodinal and metol developers seem to bring out all that is "light acted."

I find that the packers are very indifferent at one factory, as I have had several so-called 5 x 7 to measure only 5 x $6\frac{1}{2}$, and $6\frac{1}{2}$ x $8\frac{1}{2}$ to be only $6\frac{1}{4}$ x $8\frac{1}{4}$; and once a package duly sealed contained only nine plates, and in some cases plates were only *ortho* in name, being sensitive to color only as an ordinary plate.

I think they fix well in the acid or plain hypo bath, but I always keep them over thirty minutes in bath; then rinse

thoroughly, then plunge in a bath of alcohol for two or three minutes, after which I wash for one hour in a V-shaped pan, films down.

The alcohol seems to clear and help removal of hypo, as I find none by starch test after ten or twenty minutes in running water.

Of course there is nothing new or strange in the above, but I write it in hopes many may be induced to use the ortho plate instead of plain bromide, as now mostly used, that our landscape works on show at Society meetings may pass the stage of mediocrity that now prevails.

C. H. Poor.

A PHOTOGRAPHIC QUESTION.

Why do you photograph? Do you travel and desire to keep a pictorial journal. Are you an artist to whom the camera is a sketching pencil to capture effects of light and shade, clouds or wind-blown draperies? Are you a nature lover, of an artistic temperament, who, lacking the skill to make pictures with brush and pencil make photography your medium of expression?

Are you a home loving body surrounded by friends, flowers and pets whom you love and thoroughly understand, so that by photographing them in a careful, conscientious way, you give pleasure both to yourself and others.

If you are an amateur (*i.e.*, not dependent upon photography for bread), and cannot place yourself in either of these four groups, you had better give away your camera at once, do not try to sell it as the market in second-hand apparatus is chronically bearish.

Five, yes, even two years ago, an amateur who succeeded in getting a fairly distinct print of anything was considered really quite clever, the *raison d'etre* of the work was scarcely inquired into.

To-day photography is judged by a double-edged standard, in which the finest requirements of science and art are blended; a standard that lacks even standing room for the hit or miss class of work, rushed through by the hundred at the trade printers and forced upon a bored public by the fatal praise of friends.

A few years ago the practice of the family physician covered surgery and diseases of eye, ear and throat. To-day

science has so far advanced that life is too short to attain the required proficiency in all branches, and physicians desiring particular eminence after an all-round education, select the specialty to which their inclinations and surroundings lead them. So with photography; after a series of practical experiments and a good grounding in photo-chemistry, the amateur must decide why he photographs, and if he desires to attain a reputation he must choose a specialty. Especially necessary is this if he wishes to submit his work to the test of high-class public exhibitions. It may be said that to exhibit is not the highest goal of photography, neither is it in some senses; but on the other hand to compete is to stand shoulder to shoulder with the best obtainable work at home and abroad, and to be taught one's own defects by comparison, which is the most unanswerable of critics.

In choosing a specialty do not go too far from home. If you live in the mountains do not yearn for sea views, or *vice versa*, for even though you may visit the coast especially for the purpose you are not as thoroughly imbued with your surroundings, and cannot, therefore, grasp the possibilities of the situation.

If you live in a city and can get a good top or side light make simple portraiture a study.

If in a manufacturing town work up the artisan, the forge, the machine shop into vigorous genres.

If access can be had to flowers and foliage, superb studies can be made, not the stiff groups so often composed and photographed like mortuary emblems, but characteristic sprays full of vitality and painting quality. Then there is the negro who has proved an inspiration to Mr. Clarence Moore, and the comic Irishman, who, by the way, is rather more difficult to capture.

If you do not wish to exhibit your work you have still a large field before you—that of the home specialist, *specialist* mind you, not *experimentalist*, not the victimizer of patient friends, not the Ananias, forever promising prints, but the maker of dainty groups of children at play, of pictures of happy outings, of cherished spots, of old folks who cannot bear the ordeal of going to a gallery. This work if carefully done in true proportion to accuracy and artistic fitness, is like the dear old family doctor, priceless.

It may not be interesting beyond the local circle, but now and then will yield something worthy of note, and it will certainly demonstrate to a large audience, the art spirit, now

GEO. G. ROCKWOOD, PHOTO. THE F. GUTEKUNST CO., ENGRS.

BROTHER AND SISTER.

elevating and transforming what was once called a mechanical science. This home work, too, does not demand expense in apparatus, though it calls for a most discriminating intelligence. With a good 5 x 7 or 5 x 8 rapid rectilinear lens, landscapes and portraits can be made with equal satisfaction. It will give clear-cut landscapes and, without the use of stops, nice little instantaneous portraits. The most important thing to remember is not to stop down a rectilinear lens for such work, as it digs under the skin and by refraction magnifies imperfections.

The accompanying illustration "Butter is coming," was made by a Gundlach Rapid Rectigraph lens with a Prosch duplex shutter, working at high speed, though the figure was under the shade of a piazza roof, and the same lens with stops *f*32 gives negatives that yield brilliant lantern slides or enlarge to 14 x 17 with artistic softness.

In fact, to be a successful photographer does not require thirty-three lenses or elaborate apparatus, but, like many another thing, to know exactly what you wish to do and patience enough to learn how to do it, and ambition enough not to be satisfied as easily as the man who photographed his prize cow with the barn as a background. The cow walked away at the critical moment, but the man was perfectly satisfied with the photograph of the barn.

Mrs. James Osborne Wright.

PHOTOGRAPHIC STAR-BRIGHTNESS.

Starting with theoretical considerations, the problem of measuring the brightness of a star upon a photographic plate is beset with difficulties. A star, however bright, is a point of light. If from the imperfection of the lens, or of the atmosphere, or from irregularity of exposure, its image becomes expanded, the image of the faintest star will optically be expanded equally with the image of the brightest star. So if the focus is not exactly adjusted, or if the lens is not exactly corrected, the effect will optically be the same upon all the stars.

Yet, in fact, upon a photograph of the Pleiades before me, the faintest stars measure less than .01 inch in diameter, while the brighter ones measure fully .20 inch. The occasion of this difference not being founded upon optical laws, it is wholly a matter of experiment to determine by what law it is

governed, whether the increase of diameter is proportionate to the increase of light, or to its increase in geometric ratio as magnitudes are measured, or follows some other law; and whether it is the same law on different plates, or is affected by the sensitiveness of the plate, the length of the exposure, the temperature, or other attendant varying circumstances.

Another theoretical consideration I will only refer to. If a lifting force of one pound is applied to a weight of ten pounds, no continuance of it will ever lift that weight. Increase the lifting force, and at the moment of excess the weight is moved very considerably. It would seem to be a matter for experimental determination whether there is not in some way a corresponding disproportionate effect in the representation of the stars near the limit of invisibility.

This photograph shows other peculiarities I will only mention. Around many of the brighter stars there are nebulous rings, varying very much in their density and extent, and six of the stars have a conspicuous surrounding light circle, all of equal sizes, though not of equal distinctness. It is especially noticeable that of the two stars, Atlas and Pleione, the closest of the bright stars, one of the diameter of .12 inch, and the other of .10 inch, the former has the nebulous appendage and the circle clear and distinct, while the other has no trace of either.

Notwithstanding these multiplied difficulties, Professor Pickering, at Harvard Observatory, has made extensive catalogues of photographic magnitudes, derived from measuring the diameters of the images of the stars, the scale being founded upon elaborate experimental investigation. Upon a comparison of the results obtained, it is manifest, first, that the method is not yet susceptible of the precision of visual determinations; and also that there is so great a difference between the two sets of determinations that they cannot be commingled.

The light from a star is composed of rays of different colors in different proportions. In visual determinations, the red and yellow rays have predominating effect, while the blue and violet rays are subordinated, and the ultra-violet rays have no effect at all. In the photographic determinations, the effect is reversed; for it is the violet and blue rays, and even the ultra-violet invisible rays, which produce the photograph, while the red and yellow rays scarcely affect the plate, if at all. Determination by either method gives us no exact information as to the total relative amount of light coming to us from a given star. The visual method makes the red stars

unduly bright; the photographic method makes the blue stars unduly bright. But by comparing and combining the two, we may determine with much more accuracy than by either method alone, first the whole amount of light received from a star, and second, the character of the light as to its color. The spectroscope will give us still more exact information with regard to the color of the light of the brightest stars, but this can only be applied to a few selected stars; while the visual observations already include all the stars in both hemispheres visible in a small telescope; and the photographic plates about to be taken will give us the means of photographic determination of all the stars visible in both hemispheres in telescopes of a medium size.

Henry M. Parkhurst.

"GO SLOW."

It is an American trait of character to indulge immoderately in any given hobby, with a strong tendency to extract all the merits or pleasures from it in the shortest possible time. This tendency is very apparent in many individual cases, and at this time it is perhaps more manifest in bicycling than in any other one hobby. But it has been, and is still true, with many camerists. There exists a fever to go to extremes in the constant change in pattern of wheel or box; in long distance riding and snapping at everything, good, bad and indifferent that comes along.

Enthusiasm is the energy that moves the world to better attainment, but it is to some extent overdone. The reaction from a plus expenditure of energy is often disastrous. Perhaps it were better to be more moderate, ride slower and to adopt a principle of action in amateur photography that would keep alive the interest in it much longer. For example, the hand camerist is apt to lose caution in proportion to the length of his film. He whang bangs at everything that strikes his unbalanced fancy and when he gets home, he develops his work—if he deserves the name of camerist—and here comes the rub, and that which is likely to dim if not rub out his enthusiasm. The novelty of development is past. As he sits down before his ruby, green, yellow or ring-streaked light he wonders where the best work lies in that particular roll.

He turns to his note-book—if of a systematic nature—and makes a selection, takes up his scissors and straightway cuts through the middle of what proves to be the, or one of the, best exposures. It may be he started in on his one hundred or more exposures with a hope for the Dutchman's 2 per cent. of success, but he comes out with about the real thing.

Another illustration of this rush and "get there" trait is seen in the demand for papers for positives of the quickest finishable kind, the kind that must give the most unartistic results; yielding the least satisfaction to the workers thereof, if handled on the rush plan.

In this way the American is apt to exhaust the possibility of pleasure and real benefit from an excellent means of it in so short a time that his European brother looks on in amazement at him, and by his celerity he defeats himself in securing that lasting contentment and education which it may be the accomplishment would otherwise confer.

The hand camera has proven itself a delusion and a snare to many more people than it has given satisfactory results to, a fact that some manufacturers are largely responsible for in conveying the idea that a certain amount of technical knowledge of the subject was wholly unnecessary. How true this has been found both at home and abroad by the unskilled American!

Then, again, the hand camera has been most largely used in view-work, a capacity for which it has little excepting for souvenirs. But its great convenience and the rapidity with which it can be used has commended it to Americans very much more than an almost equally compact but more slowly manipulated contrivance that allows the selection of a view in a more artistic way. And in this very necessity to act slowly there is this commendable feature: there will come to one a more rigid adherence to the principle to never expose a plate where the results are not sure of satisfaction, and if we would keep up our interest in photography we need only to ask ourselves the question: How long does one work where the compensation ceases for energy expended?

A. M. Ross.

DARK-ROOM ILLUMINATION.

Much has been and is being written and published on the subject of illuminating the dark or developing room, and I do not purpose adding anything new to that which has already been published; but it is evident to the minds of many that there is something radically wrong in the present mode of illumination, especially with the ruby light and an almost totally dark-room for developing purposes. This kind of arrangement may be and undoubtedly is the best for plate-makers in testing their plates. After a man has worked at developing by such a light (ruby) for hours, the mechanism of the eye attempts to accommodate itself to the strained and altered condition, and the operator is enabled to see—after a fashion—what he is doing, but upon returning to the outer rooms or white light, the eyes are again taxed to accommodate themselves to the sudden and strained conditions very much to the injury of the sight.

Just why the ruby light is so persistently adhered to is hard to find out, unless it be photographers are afraid of spoiling a few plates in an attempt to use any other light, though it be recommended from a high source. Prejudice is one of the strongest characteristics of the human race, and when once prejudiced in favor of a certain thing or method, it is next to impossible to root it out. It is my conviction that prejudice in favor of the ruby light for developing purposes is the sole cause of its retention.

Since becoming editor of the *St. Louis Photographer*, some nine years ago, I have done little or no developing. Recently I have entered into experimenting in that direction, but found, with failing sight, induced by advancing years I suppose (please don't mention it) I found it very difficult, if not impossible, to make any headway with the ruby light. I therefore adopted the advice and followed the example of an old practitioner and experienced worker, Mr. James Hegyessy, operator at Guerin's, and put in the yellow light, and find it a pleasure, where before it was absolutely painful to develop. I prepare the light by placing a ground glass next the light with a deep orange yellow outside. I can see all over the room and even read newspaper print by its aid.

I have developed the fastest plates made, and Cramer's isochromatic by it, without a sign of fog, and took no extra precautions to shade the tray during development. Should you fear danger it is an easy matter to slightly shield the

plate during the first part of development until all danger is passed. With this light the dark-room becomes the dark-room no more and developing becomes a pleasure, and when you approach the outer or white light the eyes are not called upon to perform impossibilities greatly to their detriment.

I wish I could write with sufficient emphasis to induce every one who has not already done so to give this manner of lighting a trial. I feel sure where it is once tried the ruby light will not again be tolerated.

W. H. H. Clark.

HOW TO BEST ILLUMINATE TRANSPARENT OBJECTS WITH LIGHT FROM A KEROSENE LAMP, IN PHOTOMICROGRAPHY.

The source of the light most generally used in photomicrography is the kerosene (or "paraffin" in England) lamp; it is the cheapest and the most convenient source of artificial light for the majority of the readers of this Annual. For far greater actinic force, regardless of expense and certain inconveniences, sunlight is the best of all sources, next the electric arc light, and next the oxyhydrogen light. At present the oxyhydrogen light is used by the professional photographer, particularly in England. In this country where electric lighting is becoming so common, the arc light is distined, in all probability, to be *the* light for photomicrography. But the kerosene lamp is an excellent source, and with it some of the world's good work in photomicrography has been done.

The understanding of a few principles and the exercise of a little skill are necessary to enable a worker to "critically" illuminate an object even with lamp light. The principles are: (1) The substage condenser, or a lens acting between the lamp and the object, should project an image of the flame, or source of light, sharply upon the object; (2) the image should be large enough to cover the field, or that portion of the object which is to be photomicrographed; (3) the substage condenser should have an available aplanatic numerical aperture up to two-thirds that of the objective used; (4) the center of the source of light and the optical axis of the substage condenser should be coincident with the optical axis of the microscope. The manipulations requiring skill are:—

1. In illuminating with central transmitted light an object to be photomicrographed with a high-power objective: Place the microscope and the lamp so that the optical axis of the microscope and the flame of the lamp are in horizontal line. Turn the mirror out of line. Focus and center the object with a low-power objective—an inch objective commonly. Focus the substage condenser so as to project an image of the smallest hole in its diaphragm plate upon the object. Center this image by moving the substage condenser up or down and to the right or left. Now, providing the diaphragm openings were properly centered by the maker of the substage condenser, the optical axis of the substage and the microscope coincide. Change the focus of the substage condenser so as to project an image of the lamp flame (from six to twelve inches from the condenser) sharply upon the object. Move the lamp to the right or left and up or down until an image of the edge (turned toward the microscope) of the flame is projected vertically and centrally across the object. Now the center of the source of light, the optical axis of the substage condenser and microscope coincide. Replace the low-power objective by the high-power objective about to be used. Focus with the latter the object and the image of the lamp flame, both now in the same plane. Remove the eye-piece, look through the tube of the microscope; an image of the smallest opening of the diaphragm is seen in the tube near the back of the objective. Enlarge the opening until the image covers two-thirds of the back lens of the objective as seen through the tube. The illuminating apparatus is now in best arrangement for high-power work with first-class objectives. With inferior objectives a smaller diaphragm opening will be necessary to avoid bleaching out the object by apparent excess of light as seen when the eye-piece is again used or an exposure made.

2. In illuminating with central transmitted light an object to be photomicrographed with a low-power objective: An image of the lamp flame projected by the substage condenser is too small to cover an object as seen by a low-power objective. A larger source of light is necessary. The convex surface of a "bull's-eye" condenser, from one to three inches in diameter, can be made the source of light. Arrange the microscope, substage condenser and lamp, as before. Remove the top lens of the substage condenser (to reduce its power) or substitute a low-power objective for the optical part of the substage condenser. Focus and centre the object. Focus an

image of a small opening of the diaphragm upon the object with the modified substage condenser, and center the image. With the lamp, now from twelve to fifteen inches from the microscope stage and with the edge of the flame turned toward the instrument, change the focus of the substage condenser so as to project an image of the flame upon the object; and then center this image. Now introduce a bull's-eye condenser about half way between the flame and the substage condenser —flat surface toward the flame. While observing the object through the microscope, move the bull's-eye toward the flame. An imperfect image of the flame projected across the object is seen to grow broader and broader and then give place to an evenly illuminated field. If the bull's-eye be moved too near the flame, dark crescents appear each side of the middle vertical line; if one side is too near, or the whole lens is shifted to the right or left of the true line, more or less darkness appears in one-half of the field. When the field is evenly illuminated, an image of the convex surface of the bull's-eye is projected as a round spot of light upon the object, the flame is at the principal focus of the bull's-eye and the rays of light passing from the bull's-eye to the substage condenser are parallel. Remove the eye-piece and, while looking through the tube, enlarge the diaphragm opening until the small round spot of light seen near the back of the objective covers two-thirds of the back lens of the objective as seen through the tube. The illuminating apparatus is now in best arrangement for low-power work with first-class objectives. The diaphragm opening may be reduced as before when working with inferior objectives.

The lamp may be any ordinary flat-wick kerosene lamp. The substage condenser should be of the achromatic or apochromatic type made by Messrs. Powell & Lealand, as described in the last edition of *Carpenter*.* The Abbe condenser is not suitable; the iris diaphgram is so near the lens that an image of the diaphragm opening cannot be projected on the object, the condenser is not provided with means of centering, and its *aplanatic* aperture is insufficient to give a cone of light equal to two-thirds the numerical aperture of the best high-power objectives. The bull's-eye condenser may be any ordinary form on an independent adjustable support as commonly supplied by microscope makers. The light obtained is so bright that a colored screen placed beween

* "The Microscope and its Revelations," by the late William B. Carpenter, C.B., M.D., LL.D., F.R.S. Seventh Edition. By Rev. W. H. Dallinger, LL.D., F.R.S., Etc. London, 1891, pp. 151, 152 and 263.

the substage condenser and the source of light gives comfort to the eye. The screen may be a plate of blue tinted glass, or a glass cell, made of two plates of polished glass about one-eighth of an inch apart, filled with a blue* or green fluid.† Focussing and exposing with the blue or green cell in place greatly improves the resulting photomicrograph. Orthochromatic plates should always be used with the green cell. Other colored fluids are sometimes used in the cell to aid in getting good results when objects have colors difficult to photograph.

A. Clifford Mercer.

BRAINS ARE AN ADVANTAGE.

"Fools rush in where angels fear to tread," is an adage which, with no intention of throwing discredit upon the intelligence of amateur photographers, may be borne in mind by those of that class who, with no previous experience, purchase an outfit and proceed to reel off exposures without regard to time, place or condition.

It is an unfortunate fact that this course has been fostered and encouraged by the introducers of roll-film, and the confiding public has proceeded to attempt "snap-shots" under circumstances that offered no possible chance of success. This, added to the inevitable failures resulting from faulty materials, has disgusted hundreds with their hand cameras and reacted as a boomerang upon the manufacturers both guilty and innocent.

The extreme sensitiveness of the plates and film used by the hand camera devotee are little understood except by those whose interest reaches the point of reading and research, and while the materials will stand a moderate amount of abuse and give fair results, the best work is only done by those who do not subject them to the strain of leaky and hot dark rooms and unsafe lanterns, or of long standing in cameras, exposed to changes in temperature, moisture and heat. In summer the difficulties are increased manifold both to the manufacturer and consumer, and be the film or plate ever so sensitive, a hot dark-room and developer at a high temperature will surely

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* Dissolve 2 drachms of sulphate of copper in 3 ounces of water, and then add strong water of ammonia until the precipitate formed at first is dissolved.

† Dissolve 2 ounces (troy) of nitrate of copper and 80 grains of chromic acid in 3 ounces of water.

destroy those delicate tones and gradations that make a perfect negative.

The statement of these facts is not intended to cause apprehension of failure but simply to encourage the amateur to believe what is surely the case, that with care and the exercise of reasonable judgment better results may be attained.

Recent experiment has demonstrated that, at least during hot weather, the developer compounded with metol has more desirable properties than any yet proposed. The necessary exposure for printing strength in the negative is reduced to a minimum and the tendency to fog during prolonged development is much less than with pyro, hydrochinon, eikonogen or even amidol, so that detail may be obtained and the image built up to almost any desired extent.

Whether these gratifying results will continue during colder weather or not remains to be seen, but its use in summer, especially for films, cannot be too strongly urged.

If the camera is to be laid away and not used for any length of time, it is essential that the exposed film should be cut off and developed and the unexposed portion carefully wrapped in paper and tin-foil or waxed paper, replaced in an empty film-box and laid away in a cool and dry place.

In winter there is a tendency in celluloid to develop a charge of static electricity if roughly handled or wound off quickly in the camera; accordingly, it should be reeled off slowly and, if handled, in loading or unloading or in cutting up for development, it should not be subjected to friction. If anyone doubts this, let him go into a cold room any dry cold night and run the film through his hands rapidly, when sparks will easily be seen which will all be reproduced in the form of marks like coral or tree branches when the film is developed, and a first-rate imitation thunder storm negative will result.

To some these remarks may seem trite, but the writer knows from sad experience how many there are to whom they will reveal the causes of the wasted time, money and patience which have so often been their lot.

We claim no originality for the advice, but can heartily endorse the sentiment "Mix a little brains with your developer."

Henry W. Belknap.

FOCUSING BY PROXY.

PERHAPS the details given in full of a little photographic experience will introduce and illustrate this subject better than a catalogue of dry rules. I was called in once upon a time to photograph one of the iron cells of a certain police station, which photograph required to be accurate, as it was to be used in a court of law to elucidate and support some points of evidence.

The subject was not promising under the best of circumstances. The cell in question was one of three or four in a corridor, in a basement, with only one small window at the farther end. A daylight exposure was therefore practically impossible. The cells were of iron lattice work, painted some dark color. There was also another series of cells indentical to the first, but which, however, would have to be so proven in court before it would be accepted as evidence. These cells fronted a corridor some 4 feet wide, while the other was only about 3 feet wide. Besides, there were several windows in the wall facing the cells and having a southern exposure, so that this was a less difficult photographic subject. Accordingly the instrument was first set up here and a daylight exposure of five minutes made.

There was just room enough back of the camera to get at the ground glass for focusing; and farther, a wax match was lighted and fastened into a long stick about lens height, and this was set between the iron slats of the couch or bunk inside the cell. By means of this, the focus for the middle distance was obtained, and the general field was examined on the ground glass as well as might be in the dim light. Successive lenses of a combination set were tried until one of extremely short focus was found to answer. The camera was then carefully leveled by means of its attached plumb and spirit level, and a stout cord was tied to one of the tripod legs and was carried to each leg in turn and securely fastened so that the legs could not change relative position even if lifted up and set down and spread out again. Then a common pin was stuck into the top of the camera front about the middle, and another at the plate-holder end, and these were used as sights, and they were adjusted until they drew a bead on some prominent point, I believe it was the knob of the lock. Lastly the distance between the lens and the cell front was measured and the exposure made as already mentioned.

The object of all these several adjustments was to rig up

the camera and tripod in such a way that they could be moved to the other corridor and there set up again without any focusing, as this was simply out of the question. The apparatus was so moved and set up again, camera distance was adjusted, the sighting done and the exposure made by flash light, without seeing the image on the ground glass. Both negatives gave prints that showed what had been desired to illustrate.

The photographic moral of this experience is, that if you can't focus on what you want to take, why, focus on something else.

It might seem, according to ubiquitous hand-camera practice, that arranging the view by the finder and the focusing scale is an exalted condition of focusing by proxy, but careful workers do not hold this method in high favor, they would rather judge correctly by the image as seen on the ground glass, and do the arranging of the subject then and there, rather than by snipping away at the finished print to make it "compose," or else vainly sighing for the missing "balance" of the picture that they left a-field.

In landscape work, one soon learns by experience, using a certain lens and stop, how far the nearest object should be removed from the camera, which object being in focus on the ground glass, all else beyond will also be fairly and pictorially sharp. For instance, you settle in your mind that a certain tree thirty feet away being focused sharp, the distance will be harmonious also. However, you next come upon another scene where you wish to reproduce the same general effect, but there is nothing at the thirty foot distance in sight or available; perhaps only insignificant weeds or grasses tucked away into some dark corner of your ground glass. Here the principle of focusing by proxy can be brought into play by turning the camera on its pivoted screw and watching for something to appear on the ground glass distinct enough to focus on, and at the right distance; anything will do, even the intrusive telegraph pole. The focus being caught, the camera is revolved back to its proper position and the resulting picture will not depend upon guess-work for its success.

In taking a series of landscape views, all requiring similar photographic treatment, as in taking bits of park scenery, for instance, it is not necessary to change the focus once accurately set, and it is only necessary to use the ground glass so as to include the desired portions. This is practically carrying out the "fixed focus" idea, for the time being. It has also been recommended to have a marked scale somewhere about the

instrument after the manner of the hand camera, so that actual focusing would not be necessary in emergencies. But when several lenses are used this leads to complications, although the writer has in mind a sloppy, slushy experience incident on a last season's hunt for snow pictures, when a streaming wet ground glass and a damp magnifier and cold fingers that were all thumbs, resulted only in a very "soft" negative, all exertions to the contrary notwithstanding, that he solemnly vowed to inscribe such mark, or marks, and so he will, "when he gets time"—unless he can get some one to do it sooner for him "by proxy."

Ottomar Jarecki.

ELECTRIC LIGHT FOR THE DARK-ROOM.

The following is written in the hope that it will help some "brother photographer," as the majority of dark-rooms are small, and poorly lighted by any light.

This will give plenty of light just where it is needed, without the annoyance of either heat, smoke or smell.

First get four cells of storage battery (the larger the better), then get eight, or better twelve, cells of primary battery—Daniels or Gravity, for instance. This will give three cells of primary to one of storage battery. Now get an 8 volt, 5 ampere incandescent lamp of from 8 to 10 candle-power, with red globe, according to the amount of light you need. Now get a common switch or push button to connect the lamp with the storage battery, so as to turn on the light as you need it.

Now for setting up primary and storage batteries.

First, set up the primary battery connected in series, that is, the positive pole of one cell to the negative of the next, then connect the storage cells the same, *i. e.*, the positive pole of the primary battery to the negative of the storage cell, and connect the positive pole of the primary battery to the positive pole of the storage battery, and in about from six to ten hours the storage battery will be full, and you can turn on the light, or you can run your electric retouching machine, and work with greater comfort and convenience than any other kind of light that I have ever used, either night or day. The light is very steady, and easy on the eyes.

Perhaps as this may fall into the hands of some who may wish to use it, and are not familiar with the management of batteries of any kind, some instructions are necessary as to how the primary batteries should be set up. The storage batteries

will always have instructions sent with it for setting up and filling with acid and water, etc.

In the first place take the outside cell of primary battery (either Daniels or Gravity), and place in the copper, with a wire soldered to it long enough to connect with the next cell. Inside of the copper put the porous cup, and in this put the zinc, with a wire soldered to it to reach to the next cell. Now put into the outside cell 3 or 4 pounds of sulphate of copper, and in the porous cup put a saturated solution of chloride of soda (common salt), fill the outside cell with water, and connect up as before instructed.

After the battery has been running for a week or two draw out a little of the solution in the porous cup, and fill up with water. This battery ought to run from eight to twelve months with very little attention. However, if you should not need to use the light enough to keep primary cells connected all the time, you can disconnect them, and when the storage cells begin to fail (as you will soon be able to tell by use), you can connect up again.

The primary battery will last that much longer, as the life of a primary battery cell is regulated by the time you use it.

The storage cells should last indefinitely if kept full of acid and water, as per instructions sent with them.

I have had a plant like this in use constantly, night and day, for one year and a half, without any trouble. Every once in a while I put a little sulphate of copper into the outside cell, and a little water into the porous cup to keep it full, that is all.

C. A. Smyth.

THE FASCINATIONS OF PHOTOGRAPHY.

What a fascination the art of photography possesses for a certain set of enthusiasts who derive ultra enjoyment from the beauties of nature and their portrayal for future enjoyment.

The charms of amateur landscape work have always seemed to us analogous to those that allure the angler. To be summoned forth to those regions where nature has bestowed her choicest beauties, with an object which gives a keen zest to the pursuit, in the one instance to cater to the palate, and in the other to the intellect, and in both instances, with that amount of accompanying uncertainty of success which lures so many to games of chance, is it to be wondered at that the great army of camera workers is daily on the increase.

To insure success in photography, devote the same care to it that the earnest angler does to his vocation. Think of the attention which he bestows upon rod and fly, and how he looks to time and spot.

Have your camera and plate holders absolutely light tight, and your dark-room the same, with equal care about the character of your ruby or other non-actinic light. Select the most picturesque subjects, with good grouping and breadth of light and dark. In landscape work avoid absolutely clear days, as the contrast is then too great between the portions in light and those in shadow—and without atmosphere, or the shadows of passing clouds there can be no artistic effects. Masses of white cloud act as reflectors and give luminousness to the shadows. The sun shining through a thin scum of cloud softens the light and greatly aids in getting out detail in the shadows where there is much foliage, and, even in architectural work, such condition will be found to make a preferable lighting.

Strict attention to these matters, with a good brand of plates, and care in the development will ensure good work, and, with the bodily exercise and exhilaration from the time spent amongst the charms of picturesque nature, the camera men and women are sure to be the healthier and the happier.

Xanthus Smith.

INSIDE A CAMERA.

Were you ever actually inside of a camera while an exposure was being made? Through the courtesy of Mr. W. G. Riggs, of the Southern New England Telephone Company, the writer has had that privilege, and also that of witnessing the development of one of the largest photographic plates ever made.

During the past year Mr. Riggs conducted a very interesting piece of photographic work for the Telephone Company at New Haven. Some time ago the company conceived the idea of reproducing a map of Connecticut to a certain definite scale. The work was offered to several professional photographers, but none was willing to undertake the task even at the liberal compensation the company was willing to pay; so Mr. Riggs, who is an experienced and skillful, as well as an enthusiastic amateur, undertook the work.

The map was photographed in sections, each negative representing the territory included in a telephone district, and from these negatives were printed, by contact exposure, positives of

each section. These positives were then enlarged to the required scale, and here careful calculation was required, for each enlargement must be to precisely the same scale, or the parts would not fit together. Some of these enlargements were made on 18 x 22 plates, or smaller, which is not unusual; but the interesting part of the operation was the manipulation of some 24 x 36 plates, made by special arrangement with Mr. John Carbutt on an order from Messrs. Charles W. Whittlesey & Co. These plates are, by the way, the largest Mr. Carbutt can or has made on his machinery.

What we shall now proceed to describe may not be entirely novel to those initiated into the mysteries of bromide enlargement, yet there are points of difference between the two processes.

But imagine yourself standing *within* an immense camera while the exposure is taking place, for this is what Mr. Riggs actually does. He converts his dark room, a room of about 8 x 10 feet, into a mammoth camera. The positive is fitted into an opening in the outside wall, and the lens properly hooded at a sufficient distance inside. A screen has been erected on a frame about four feet high, which is movable to and fro on wooden tracks fastened to the floor, and to which the screen frame can be securely clamped when the exact focus is attained. What serves as a ground-glass, is a 24 x 36 sheet of plain glass, covered with white paper, and fitted into grooved cleats on the screen frame.

A black cloth is thrown over the lens, and by faint red light the box of plates is opened, and one of them secured into the exact position vacated by the so-called ground-glass. We were now standing, as it were, inside of a camera 10 x 8 x 7 feet, *not inches*, with the plate in position, and presently Mr. Riggs raised the cloth over the lens, and we saw what probably not one enthusiastic photographer in a thousand ever beheld. We actually saw the image itself acting on the sensitive film, and for thirty seconds we watched its fine pencils of light on the pure white film.

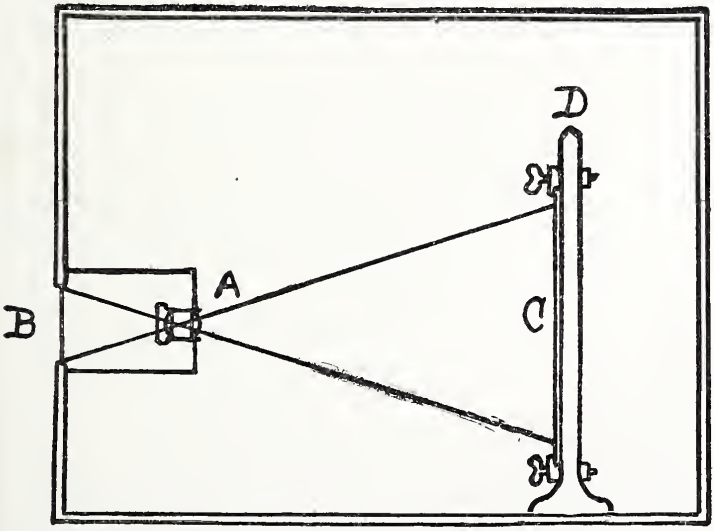
Next came the developing. An iron tray of about 3 feet by 3 feet had been especially constructed and japanned. It took three quarts of developer. "Eiko cum hydro" was used. One quart was old developer, and two quarts new of one-third the ordinary strength. This brought the image up slowly, and so gave plenty of time to flow the developer evenly. The same tray had to be used for fixing, and while the plate was being washed of developer, the tray was rinsed, and then the acid

fixing bath was applied. The plates were coated with Carbutt's No. 16 emulsion. The work is thoroughly scientific and unique. All this was done, and that practically inside the camera, viz.: The plates were opened, the focusing done, the exposure made, the plate developed and the plate fixed. To the writer the most impressive part was when for thirty seconds we actually watched the image portrayed on the film.

The subsequent process of finishing the map from these sections was performed by Mr. Riggs' assistant, Mr. F. P. Lewis. This operation will not be described here, but it was extremely ingenious, and required consumate skill in its execution.

The whole number of negatives and positives made was between 80 and 90. Of the final negatives, *i. e.*, those from which the map itself was made, there were six 14 x 17, twelve 16 x 20, five 20 x 24, four 24 x 36.

The accompanying diagram illustrates the arrangement of the room and apparatus. The large square represents a vertical section of dark-room itself.



A, the position of the lens.
B, the position of the positive.
C, the position of the plate.
D, the sliding-frame supporting plate.

Charles W. Whittlesey.

DEVELOPING WITH AMIDOL.

Amateurs often change from one kind of developer to another, follow the exact directions for each, and unreasonably blame each because it does not work equally well on every class of exposure made by them. This none have a right to expect, as all developers need to be modified to act in accordance with subject and the timing of plates. This modification of the developing bath, however, often leaves it unsuitable for the plates to follow. If we take a very powerful agent like amidol we may in a sense modify it before use so that many plates of varied subjects and timing may be developed with little change or waste of material.

Amidol is at its best when used in the dry form, and as it keeps splendidly and is cheaper so, owing to the large number of plates an ounce will do, it is better to use it freshly mixed. By weighing out a few 15 grain powders we have it ready for use at any time. A stock solution of 2 ounces of Dr. Andresen's pure sodium sulphite dissolved in 10 or 12 ounces of water gives us virtually the basis for a fine one solution developer. For small plates (large in like proportion) take of water 7 ounces and of the sulphite solution 2 ounces, add one 15 grain powder of amidol and when well mixed in the graduate, pour the larger half, say 5 ounces of this into one tray for a full strength bath and the other 4 ounces into another tray, adding to this last bath 2 ounces more of water. With a small bottle of solution of bromide of potassium (1 to 10) we now have the means of controlling almost any degree of exposure without continually altering the baths except to weaken with water as needed.

Begin developing in the last or weaker bath. If the plate is greatly over-exposed a few drops of the bromide solution retards its too rapid development, and by keeping the plate in this restrained bath sufficiently long it will acquire all the density necessary. If greatly under-exposed, its removal to the stronger bath for a time will assist this, unless the plate was beyond redemption, and between these two baths used according to the requirement of each plate, a larger percentage of good negatives may be had. No time is lost modifying baths, or soaking plates a long time in baths which prove in the end to have been very unsuitable for the proper development of the plate.

The density of an amidol developed plate is deceptive to those accustomed to other agents. It is not necessary to carry

development as far as with our old friend pyro for instance. If we allow the amidol developed plate to remain in the bath until the image disappears from its face, and the plate darkens much, we should have a negative so dense when fixed and dried that it would take hours to get a print from it. The plate correctly developed with amidol is much more transparent, is a quick printer, yet has ample density of its own peculiar kind, without the details being lost or the high lights too chalky.

Another deceptive feature when using amidol is that its wonderful strength and energy rushes the development of any fairly timed negative so rapidly that it is often mistaken for a terrible case of over-exposure when such may not be the case at all, and for this reason (in part) I have advised the use of the weaker bath as well as the normal, to meet the exigencies. With a little practice the amateur may learn the peculiarities of amidol, which are not serious drawbacks, and be grateful, as I am, for having with us in the present one of the "developers of the future."

C. M. Brockway.

PATIENCE *vs.* ALKALI.

There are many photographic fallacies, but none, perhaps, causing more undesirable negatives than the excessive use of alkali in the developer through the sadly mistaken idea that its employment will "force out detail," or as some are pleased to state it, "increase the detail." "Increase," forsooth! It does accelerate development, certainly, if time be of greater consideration than the quality of the negative. It is very easily demonstrated that if a developer be alkaline, and only slightly so, it will secure from the exposed plate all the detail that any greater strength, either at the start or by successive additions, can assure. Most of the developers in use contain too much accelerator. They are designed for workers who have not the time to wait for the surer and slower results, but they need not, and should not be used by those who can command the time and patience for securing more beautiful negatives. All the finer gradations are lost, buried in a too rapidly developed plate, and such a negative is unfit for enlargement, or any other artistic use.

Frederick A. Jackson.

A PLEA TO AMATEURS FOR TIME EXPOSURE, WITH FACTORS IN PHOTOGRAPHIC EXPOSURE.

In the commendable book, "The Photographic Instructor," by the editor of The Annual and of *The Photographic Times*, ample directions are given for exposure, but there are many factors to be taken into consideration, the proper comprehension of which will aid the amateur, so that his failures will be the exception, rather than is often the case, an average of one perfect picture to four or five indifferent ones. Now the professional photographer takes into consideration the following factors:

1. Light.
2. Rapidity of plate.
3. Subject.
4. Size of diaphragm.
5. Time of day.
6. Distance.
7. Altitude.

The matter of *light* and *time of day* are of necessity correlated, all things being equal.

It is a cardinal rule that the hours between eleven A. M. and three P. M. are the very best for work, but they may be productive of failure if the plate, diaphragm and subject are not properly selected.

At from between half-past five to six o'clock on a July afternoon I have taken snap shots of a church on which a strong yellow sun was pouring its rays, and the resulting negative and print deceived several expert photographers, as every detail, even to the finest, indicated time exposure. I used Waterbury Detective, Seed 26, *f*/20.

I was careful not to have any cavity effect, such as the deep entrance to the porch and vestibule. Had I taken the church entrance partly in the shade, it would have been simply a black spot, without detail as to doors, etc., as the exposure was too short for badly-lighted objects.

With a slower plate and a proper exposure the picture would have been perfection at any point. Having only quick plates, I was compelled to a few limited, although very pretty, views.

1.—Light.

Is it bright sunlight, overcast or gray, or is it luminous and

overcast? Of course, with bright sunlight the exposure will be short, but there are oftentimes in overcast days the light is very rapid and quick exposure is required. Land views along the shore and not including the water but close to it are intensified by the proximity of the water.

The foregoing is but a brief inkling as to the value of light. Specifically, we must combine the subject with light, and the direct effect of the latter on the former. We are not to judge the quality of light in general, but the illumination of the subject itself; its coloration; its position or pose; the effect to be desired, and many other essentials which will readily occur to the reader. The time of exposure is governed by all these, but the "plate valve" is equally as important, and is, in fact, the true basis of estimation.

It is not as difficult as we would think to make a time exposure. I use a Scovill level screwed to my Waterbury, and make a "tripod" (at sufficient elevation) on my knees and steadily hold the camera for the necessary time, when the exposure required is sufficiently short; or, it can be held against the hip or chest; but in the latter position the breathing must be held, or easily indulged in, to get a true picture. I have seen an interior—an excellent negative and print—made very shady by the jarring of the house caused by passing wagons and trucks; the exposure in this case requiring one and-a-half minutes.

2.—Plates.

By way of introduction, it is necessary that plates be selected in their rapidity according to the subject. Judgment will decide, in taking the factors into consideration, the plate required.

After careful tests I would put the relative values of plates in a way that one may select therefrom, and I have taken the excellent and reliable plates of John Carbutt as the standard, and graduate others from that standpoint of emulsion.

I do not seek to recommend any plate, but use them according to the following table of rapidity.

The amateur thinks, or rather too often believes, it is impossible to get too quick a plate. A comparatively slow instantaneous plate and slow shutter will give more detail and definition under proper conditions than a very quick plate and rapid shutter. When objects are in rapid motion both quick plate and shutter, of necessity, are required.

Plate Rapidity.

* According to plate rapidity the following values I believe to be true:

Carbutt B	equals	1—Standard of Value.		
" Eclipse	"	8	times quicker than Carbutt B.	
Cramer Banner	"	4	" " " " "	
" (60) Crown	"	14	" " " " "	
Stanley	"	16	" " " " "	
Seed 23	"	5	" " " " "	
" 26	"	6	" " " " "	
Harvard	"	6	" " " " "	
New Eagle	"	9	" " " " "	

3.—Subject.

Sky or sea	equals	quickest subject or exposure.	
While objects on land	"	2½	times more exposure than sky or sea.
Open landscape	"	5	" " " " " " "
Average landscape or portraits	"	10	" " " " " " "
Dark objects, such as yellow or red,	"	20	" " " " " " "
Very dark objects	"	30	" " " " " " "

For instance: Sea and sky with quickest plate and shutter apt to be over-exposed. Same view with quick shutter and slower plate should give perfect negative.

4.—Diaphragm.

The proper use of the diaphragm is misunderstood by many amateurs. Common sense tells us that the smaller the diaphragm, by letting in less light to the plate, the longer the exposure and at the same time greater definition.

Experimentally, I know of no better lesson than to go into the woods and with a full-sized stop get the view on the ground glass. Many of the trees have a "woolly" look. Pin a handkerchief on a tree in the middle distance and focus upon it. Now stop down till all "woolliness" disappears and everything is clean cut. Then figure out your exposure thus: Subject dark; light shaded; stop about *f*/20. Use a medium rapid plate and it will take about eighteen to twenty seconds. I may say in passing that all these notes apply to the spring and summer season, and from nine o'clock A.M. to three o'clock P. M. A good deal depends upon the rapidity of your lens, etc., and all of these hints are of value if you govern them by the seasons of the year, with proper allowances for winter, etc.

* As will be seen, these values almost exactly correspond with Watkins' estimate.

6.—Distance.

Where one desires a great deal of distance in a picture it can be acquired by removing the back combination of the lens and reversing the lens tube, so that the front lens is next to the camera, with open back part to the front. This I use only with my large camera, having an additional lens-board large enough to hold the flange snug and light-tight, and a cap covering the opening tight.

7.—Altitude.

To quote Professor Ch. Ehrmann: "Bunsen discovered the actinicity of light increased proportionately with the increase of altitude above sea level. * * * * Students of the Chautauqua School, residents of Colorado, met with repeated difficulties. * * * and an exposure meter has proved in their hands an entire failure." He shows that at the Chautauqua Assembly Grounds, 1,500 feet above the sea level, a Waterbury B lens, Carbutt 27 plate, stop *f*/35, requires but two seconds, while with all the conditions the same, in New York City, an additional second is required. Ehrmann also mentions a Waterbury Detective, *f*/20, and Seed plate 23, taking an excellent moonlight picture of Pike's Peak, Colorado, with one hour's exposure, which could not be obtained under two hours at the Chautauqua Assembly Grounds. Great credit is due to Ehrmann for his demonstration of this factor. His article entire can be found in *The Photographic Times*, May 19, 1893.

I still retain my admiration for the Waterbury Detective Camera, and carry with it a light tripod and two series of holders. One series marked A, B, C, etc., for instantaneous plates, selected; the other series in numerals, *i. e.*, 1, 2, 3, etc., for time plates. I easily carry both on a bicycle, or on pedestrian trips. Many very beautiful wood interiors I have thus taken, impossible to snap, yet with rapid plates and time exposure get exquisite results. By means of my large camera I have made life-size enlargements on bromide paper in which every detail is perfect in the portrait, and especially good ones on short time exposure.

To sum up, the real necessities for snap photography are:

1. Objects in rapid motion.
2. Objects expected to suddenly take motion.
3. To catch expression on the face.
4. To catch attitudes existing only momentary.

While I feel it weakens a writer's article to recommend in a photographic journal any particular adjunct, I find my Watkins exposure meter invaluable. With my Waterbury and exposure meter I go through the photographic maze without fear and with good results, and, of course, too, with my large camera. At all events, the exquisite effects obtained by true exposure will convince the amateur of the value of this means as compared with instantaneous exposure, and the writer earnestly hopes that these hints may be of some value to his photographic friends.

S. Hemingway, M.D.

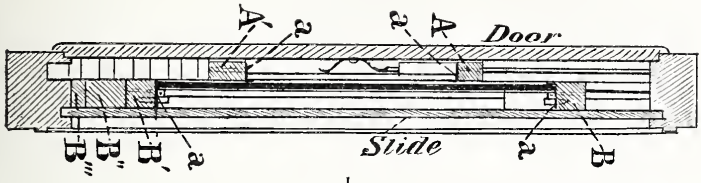
PROPER ARRANGEMENT OF PLATE-HOLDER FOR SCREEN-WORK.

In making cross-line negatives for the half-tone process, with a screen, the most common method of arranging the plate-holder to accommodate the screen and sensitive plate in their proper relative positions, is by means of a "kit" or frame with silver corners, made to fit the screen on one side and the plate on the other side of the silver used for the corners.

This method presents numerous disadvantages as compared with the arrangement I am about to describe, and which, though involving a somewhat greater expense in adapting it to an old holder, will be found to abundantly repay this extra trouble in a very short time in the facility, cleanliness and economy of working.

I consider one of the most essential requirements of any arrangement for this purpose to consist in having entirely separate parts for holding the screen from those which support the sensitive plate, and for obvious reasons it is a great advantage that both should be adjustable to fit various sizes of both screens and plates.

If the plate-holder is to be made entirely new to be adapted to this work, Fig. 1 shows a simple arrangement covering the points named above. With this arrangement, any screen within the maximum capacity of the plate-holder may be used, and instantly substituted by another of different size, and at the same time a sensitive plate of any irregular size may be used with any screen; another incidental advantage of this arrangement is that the screen may be used to its full size,


A
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A
Door
B'''
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B'
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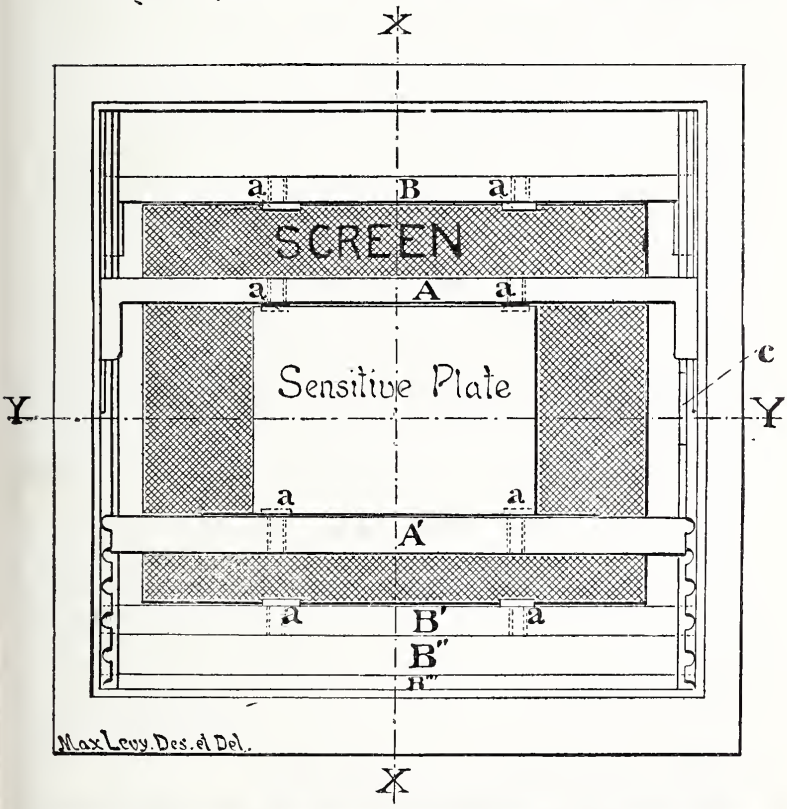
a
B


X
a
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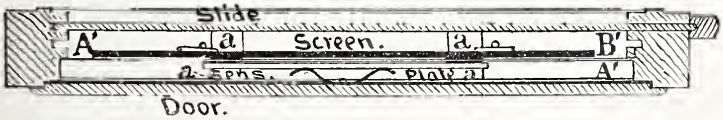
X


Slide
A'
a
Screen.
a
B'
Sens. Plate
A'
Door.

and may, therefore, be one size smaller than the largest plate which the holder will take, that is, a 10 x 12 screen is the largest that can be used to advantage in an 11 x 14 camera, while in most of the "kit" arrangements an 11 x 14 screen would yield only the same size picture as its maximum efficiency. The diagrams will show at a glance the construction as applied to a "Bonanza" holder. The strips A and A′ are the ones ordinarily used to support the sensitive plate, but are changed, inasmuch as A is not rabbeted, and A′ is not a trough, but both are plain straight pieces, with a flange consisting of a piece of thin sheet silver, riveted to the wood, and bent at right angles, shown in the drawing as a, a′. The holder is made about one-half-inch thicker than usual, and the additional one-half-inch is placed between the rests for the sensitive plate on one side, and the slide on the other; this space is grooved vertically the entire length or height of the holder, and in the grooves are fitted the strips B and B′, made exactly like A and A′, with the flanges facing those of the latter; the screen fits against these flanges and is held in place by pins driven into the wood behind each flange, and where various screens are to be used in one holder, and these vary in thickness, the space between the flanges and pins should be sufficient to accommodate the thickest screen, and the thinner ones may be wedged in with wooden wedges. B″, etc., are pieces similar to B′ without flanges, and are only to fill up the space in using a smaller screen.

Any plate-holder can be altered to this design by a good cabinet-maker by adding about one-half-inch to the thickness, which will bring the slide further away from the plate, and the grooves in which the slide moved originally may be used for the sliding pieces which are to hold the screen; in this case the ground glass frame will, of course, require the addition of the same thickness.

I use clean strips of filter paper laid on the bottom strip A′, to catch the surplus silver, and the plate should always be well drained before being placed in the holder.

With this arrangement, and moderate care, very clean screen negatives can be regularly made; the holder lasts indefinitely if the filter papers are replaced after four or five plates, and silver will never find its way into the balsam with which the screen is sealed, as so often happens in using the frames.

Max Levy.

BUBBLES.

"Pleasures they find in trifles light as air."

An elaborate outfit is not required for the production of good photographs; but to make good photographic pictures one requires a good lens and a certain amount of artistic knowledge. The latter cannot be learned wholly from books, for though like finger posts they may direct, that is all they can do. By one's own exertions only can the goal be reached. If photography (I refer to artistic photography) were the simple thing some would lead the uninitiated to believe, everyone who could afford to buy a camera would be a photographer. To become a photographic artist requires an amount of patience which few possess, and an expenditure of dollars that none but an enthusiast is willing to submit to.

But then it is not necessary to be a millionaire to succeed. A moderate income and a few hours' leisure one or two nights in the week are quite enough for any one artistically inclined. The accompanying picture "Bubbles" was not made in a photograph gallery, but in a back yard, and estimating the cost of the photo and the material used for the window in which the children are sitting, did not cost more than a couple of dollars. Here is how it was done. The window was made of boards and scantling while the background consisted of a piece of black velveteen. The latter I borrowed from my wife after solemnly promising not to drive nails through it. I kept my promise for I only used tacks. The children were trained to pose in any position, and when it came to making this picture I experienced very little trouble. What I really wanted was to have them in their every-day clothes, the clothes they were accustomed to when making mud pies or rolling in the sand. But their mother would not hear of anything of the sort, and so I compromised on their "go-to-Sunday-school clothes." The expression on the face of "Little Nell" is one of intense interest as she watches the growth of the bubble, for she is trying to blow a larger one than her brother Gordon did a few minutes before. He is quite as much interested as his sister and is watching the expansion of the bubble while mentally measuring its size. Parenthetically I may say that when the young rascal found it was getting a little larger than his own he coughed (by accident of course) and blew it away.

One sometimes tires of making landscape pictures in his

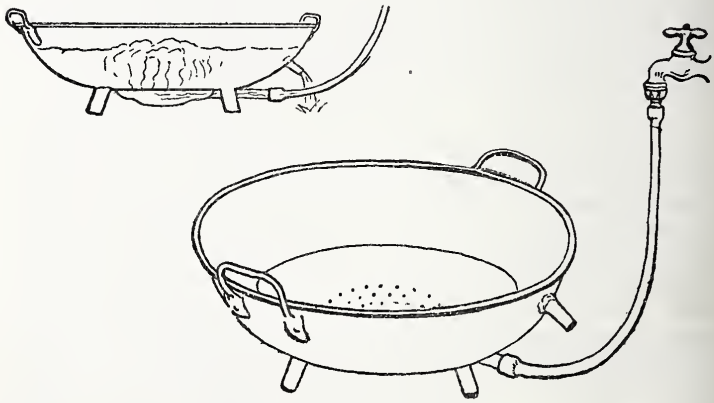
own neighborhood but never wearies of making pictures of farmers, farm laborers and children. This field is inexhaustible, and with a little ingenuity many interesting pictures may be secured. Then there are photos of cattle, sheep, etc., that are well worth having. Country roads, lanes, peasants and groves afford a wealth of photographic material that cannot be worn out in a life-time.

William W. Fox.

A THOROUGH PRINT WASHER.

I HAVE used for some time a large washing pan for prints, a description of which may be of use to some reader of THE ANNUAL.

I had been in the habit of washing prints in an ordinary tray, and noticing the tendency of matting together, I went to a tinsmith and had a good-sized, deep pan fitted with a rose sprinkler in the center of the bottom, which connected with the outside of the pan by a tin tube, to which I connect a



rubber tube leading to the water supply. An outlet was made at the top of the pan to take the water off, and the whole set on four small legs so as to stand steady.

The water, coming as it does from the center of the pan in a fine spray, keeps the prints in motion all the time, and washes more thoroughly and in less time than anything I ever tried before.

Another labor-saver that may interest some one is a good-sized window sash glazed with ground glass, which can be set at any angle, to put the printing-frame back of when printing from thin negatives, and will save the trouble of tissue paper, which is considerable, especially when the wind is blowing.

E. F. Bacheller.

GLASS ETCHING.

Among the photographic processes applied to the decorative arts there are some which, by their simplicity and the fine results obtained at very little cost, should be practiced by the amateur. Some time ago I communicated to a lady, living in one of the Western States, who is a photo-ceramist of no ordinary merit, a process of engraving on glass, which I choose as my contribution to The American Annual of Photography for 1894. It is as follows:

A glass plate—perfectly clean, of course—is coated with a solution of bichromated albumen:

Clear albumen	3	ounces
Aqueous ammonia conc.	1	drachm
India ink	2	drachms
Ammonium bichromate	½	drachm
Water	3	drachms

When dry the plate is exposed under a diapositive in line for a period of from two to three minutes in the sun, then immersed for ten minutes in water, then gently rubbed with a soft rag, under the tap, to dissolve the albumen not insolubilized by light and finally dried by heating it strongly over an alcohol lamp or in an oven. This done, the plate is allowed to cool down, and having bordered the plate with modeling wax, one pours over it a solution of

Sodium fluoride	3	drachms
Alcohol	1	ounce
Water	3	ounces
Acetic acid	1	drachm

In a few minutes the design is engraved. The etching fluid is then poured off in a gutta percha for future use,* the plate rinsed, the wax rim removed, the plate immersed in a

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* Hydrofluoric acid is very corrosive and should be handled with care. It can be kept only in gutta percha vials.

solution of potassa to dissolve the albumen, then rinsed, and when dry the design will appear opaque on a clear ground.

A great many objects can be used as positives: Stamped paper, such as placed in boxes of candies; Swiss muslin ornamented with stars, or any other design, makes a good border to frame appropriate images; laces, embroideries, curtains, and the like, produce fine ornaments; pen and ink drawings on tracing paper, or wood-cuts, lithographs, etc., rendered transparent by *white* vaseline* can also be employed.

P. C. Duchochois.

PICTURE FRAMES AND MATS.

A PICTURE is worthy of a mat and frame in harmony with the subject and the quality of the picture.

Many an excellent picture has been practically destroyed by the slip-shod manner in which it has been matted and framed.

Photographs as a rule should be matted in cream or a light tinted board; the gray and blue tinted board or paper harmonize with a photograph probably better than a cream colored board, and appear better in thin light colored frames of natural wood, steel or silver.

A gold or gilt frame should never be used with a photograph except for a large or medium size portrait.

Etchings should be treated in the same way as photographs, with the exception of the sepia toned, which can be framed in light colored woods and gilt to advantage.

Water colors or oil paintings and the handsome imitations issued by the art publications, at present, are very handsome when matted with a bronze or gilt mat; it is best to have a slight contrast in the color of the mat and the frame, and if the mat is of a shade slightly darker it gives a very pretty effect.

Colored pictures should always be framed in gilt; the gilt frame seems to brighten up the coloring and bring out the strong points, while steel, silver or white frames seem to destroy the harmony of the colors.

Don't try to have the frame-maker mat your picture, for ten chances to one you will find he has but one channel in which his ideas move, and that is to cut the mat out of some one of

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* Vaseline disappears after a certain period, leaving scarcely any trace or stain.

the few kinds of matting-board which he has in stock. He pays no attention to the class or kind of picture, but bangs away at it, but never forgets to charge enough for it when horribly butchered, just because it is easier for him to make a plain mat.

To properly mat a picture it requires very little skill; it is a very simple matter, and with a little ingenuity and thought one can make all kinds of combinations that will add wonderfully to the effects of the picture.

Take a sheet of regular matting-board, or a sheet of bookbinders' board will answer the purpose, lay the picture on top of the board and with a fine needle punch a hole through at each corner into the board. In making the holes be careful and make the mark about one-sixteenth to one-eighth of an inch inside the corner of the picture. With a rule or straight edge to guide the knife cut a straight and even line. It is advisable to first cut the corners deep with the knife point so that you will not slip over when cutting the cut from corner to corner and spoil the mat.

The edge of the mat may be beveled with a knife or rounded with a file; the beveling process is very difficult, as the slightest variation from a straight line will mar the edge. If the board is not too thick the square edge will look well.

It is advisable to make the width of the mat in accordance with the size of the picture, generally ranging from $2\frac{1}{2}$ to 4 inches; the frame covers about $\frac{1}{4}$ of an inch of the mat. In matting pictures you should always keep in mind to cut the mat so as to nip the picture all around, and to cut off all the names and printing outside of the picture.

A very handsome gold or gilt mat can be made by covering the mat with a coating of sizing made from a thin sizing of glue or gelatine and water; after coating the mat allow the sizing to dry slightly until it is sticky, then with a flat camel's-hair brush or a piece of paper transfer the gold foil from the book to the mat.

Bronze powders, of any color or tint, can be brushed over the sizing with a small wad of cotton and after a short time the surplus bronze can be brushed off easily.

There are numerous colors of bronze powders that can be procured at any art store; the green and copper colors make a harmonious treatment for fruit and flower pictures, in colors.

Other coverings can be put on of cloth of almost any kind and texture; cloth with light colored ground and a small figure worked through makes a handsome mat. The cloth

should be well stretched over the board and either pasted down or sewed along the edges so that the sewing will not show when framed.

Bunting, canvas or burlap in the original colors, or sized and bronzed in any suitable coloring, are very nice and appropriate; the rough texture of the cloth adds to the appearance of the picture.

Tissue paper is one of the nicest coverings for a mat and it can be procured in all sorts of shades. The fine grade, or "French" tissue paper as it is termed, is the best, as it is of a fine texture. In placing the tissue paper on the mat, lay the mat face down, on the sheet of paper, trim the paper down so as to leave a margin outside of about one inch, paste all around the edge of the mat, fold the tissue paper over and press it down well, keeping it stretched as tight as possible; as soon as it seems secure cut the center leaving a margin of about one inch around the inside margin of the mat, then cut a slit from the corner of the mat to the corner of the paper in the same direction as if a miter of the corner, paste the edge of the mat, fold over the paper and press it down tightly. In stretching the paper be careful and leave no wrinkles if possible. After the paper has dried slightly take a damp sponge and go all over the tissue paper with it so as to thoroughly dampen it, set it aside for a few minutes and it will dry, and draw as tight as a drum head on the matting board.

Crêpe tissue paper makes an elegant mat, but it must be carefully stretched so as not to leave wrinkles; it must not be dampened, as it would take out the wrinkles which give the crêpe appearance.

Another pretty effect for a mat is to stretch a fine piece of veil over the matting board, stitch it all around the board, but keep the needle holes close up to the edge, within a quarter of an inch to the edge; then with the scissors cut out the center of the veiling close to the inner edge of the board. If the color of the matting board is of a lighter shade, but of the same color as the veil, it makes a beautiful combination.

A rough mat is made by covering the board with a thin solution of glue and covering the glue with either silver sand or ground hominy, according to the roughness desired, then after the material is thoroughly dried, give the mat a covering of sizing and bronze powder.

J. E. McCrickart.

ALBERT A. EDDY, PHOTO. THE ALBERTYPE CO., N. Y.

THE OLD HOMESTEAD.

AS TO THE CAUSE OF FAILURE IN PREPARING PLAIN PAPER.

To those who have had poor success in securing brilliant results in plain paper printing, I want to say a few words, and if possible put the experimenter on the right track. In almost every case of failure, I am satisfied that the trouble encountered is in the toning bath; inasmuch as the paper prepared in this manner is extremely porous, it takes the gold almost instantly, hence it has a tendency to over-tone.

In order to be definite, I will give the exact method for toning, which I use with almost invariably successful results.

In the first place, after the print has been made, soak it for a few minutes in a solution of citrate of soda, 3 grains to the ounce of water, then wash until all the free silver chloride is removed; they are then ready to tone, for which I recommend the following bath:

Make a stock solution of chloride of gold and sodium, 15 grains to 15 ounces of water. Take one ounce of this and, after neutralizing it, add to 24 ounces of water, and add a small pinch of ordinary table salt, and your bath is ready for use.

Now place your prints one by one, until you have six or eight in the bath, the temperature of which should be in the vicinity of 65 degs., but this is not really essential, as the only effect this can have will be to hasten or retard the action of the bath according to the temperature, but as the tendency is to tone too quickly, I think that it is better to keep below rather than above this mark.

The prints are a cherry color when they go into the toning bath, and they should be removed at once when they take on a purple hue, for if they are left longer, they become a dull gray color, and the brilliancy rapidly disappears; usually by the time the last print is in, the first one is ready to come out, but this will depend greatly, however, upon the temperature and the quantity of gold present.

Immediately after toning, rinse in two changes of water in order to stop the toning action, and then fix in hypo 1 ounce, to water 10 ounces, for 10 minutes, keeping the prints in motion; after which, wash thoroughly.

In the fixing bath they turn a disagreeable brown color, but after they are dry they resume, to a great extent, the color they had before fixing.

To fix without toning gives a very brilliant and artistic result.

W. S. Waterbury.

A TRUSTY HELPER FOR SPECIAL PHOTO PRINTING.

The old saying that "Time is Money," does not always prove to be true, especially with those who follow the practice of photography; but it often happens that time is too short or too fully occupied to allow proper attention to the many details of work which crowd into the sunlight hours of those who use the camera and the printing frame. Hence the necessity and value of any device which may assist the busy worker, without any great amount of personal supervision. The accompanying cuts and description will, it is believed,

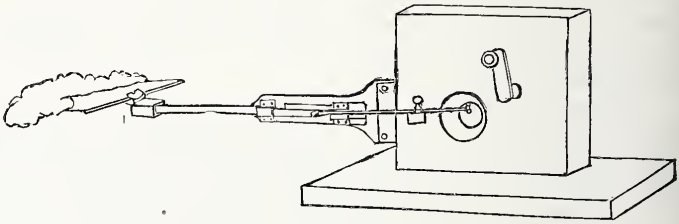


Fig. 1

make plain to all the construction and working of a simple piece of apparatus which has, by the perfect work done through its means, been found useful in cases requiring local printing, such as vignettes, cloud effect or high lights, which show lack of detail, unless action is prolonged beyond the time required for the shadows or half tone portions of the negative. Of course such work can be very well done by diffused light, or partial obscuration produced by the use of tissue paper or its substitutes over a properly shaped opening in a stationary mask, but such work is slow, and in dull weather almost impracticable. Printers often dread orders for it, and patrons express dissatisfaction with the enhanced cost, delay in execution, and unsatisfactory manner in which their orders have been filled. The device herewith submitted furnishes the means for changing the conditions of such work, and rendering it almost as easy as ordinary plain printing; and the results may be calculated with far more certainty than possible in hand work done by constant attention, while the time required for filling an order is no greater than for ordinary printing, as full sunlight or the strongest light procurable may be utilized

without the use of any semi-transparent medium like tissue paper or its substitutes, while at the same time a far more delicate character is given to the work, with entire freedom from the harsh contrasts or sharply marked outlines often observable. The plain square box or case shown in the illustrations contains a strongly built mechanical movement actuated by a powerful spring which is, when fully wound up by the crank shown in position, capable of maintaining constant motion about two hours. The motion is rendered steady by the ordinary screw and fan escapement and regulator. The crank-pin is easily adjusted for distance of throw by the concentric motion of the small disk upon the large wheel on the secondary driving shaft. The pitman rod is by screw joint attached to the central part of a square rod of wood which plays freely through two brass sleeves attached by thumb-screws to the back of the support or carrying frame at any desired

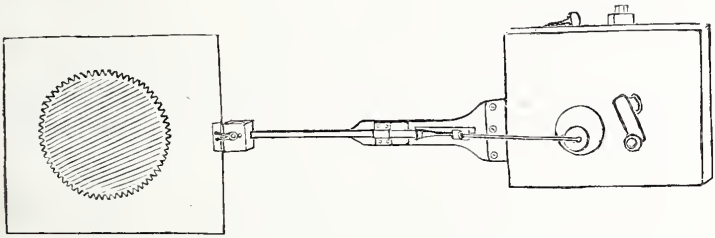


Fig. 2

point. On the free or outer end of this square bar is fixed a rotating head which carries a clamp for holding the vignettor or obscuring portion of the device which plays over or in front of the printing frame when in use. The carrier frame and base board upon which the movement box stands, as seen in Fig. 1, are attached to the box by key-hole slots and round headed screws and are easily removable without tools. When the spring is wound, a steady, constant forward and backward motion is given to the pitman rod and its attachments. Whenever a rotary motion of the obscurer is desired, one of the sleeves through which the bar plays, is removed as may be seen, with its screw lying on the case in Fig. 2, and the rear end of the bar is fastened to the pitman shaft by the loose sleeve carried on the shaft as shown in Fig. 1, and seen applied in Fig. 2. When so arranged the one sleeve through which the square bar plays, freely swings on a loose joint in the hub by

which it is attached to the carrier frame. By varying the distance of this swinging sleeve from the pitman pin, any desired amount of rotation may be given to the opening in the vignettor, and this swing may be through a constantly varying orbit of rotation produced by a supplementary bar attached to and actuated by a ratchet and paul upon the main bar. This is not shown in the illustration, as it can be clearly understood by description above and its introduction would tend to obscure the main working parts of the apparatus.

A long-felt want for some such appliance led me in the early part of last spring to begin its construction in which I have been most ably assisted by the Lawrences—father and son—the ingenious and well-known horologists of Lowell, Mass. The machine is a complete success and relieves me from giving constant personal attention to some of my most tedious work.

O. G. Mason.

PHOTOGRAPHY AND SCHOOL-ROOM WORK.

For the benefit of fellow amateurs who are also fellow teachers, the following account of "interior" work is respectfully submitted.

Ours is an average school. We have among our pupils about the usual proportion of the wide-awake and the sluggish, the diligent and the indolent. Our teachers are striving earnestly to work above the average in professional character.

For a good while we were dissatisfied with the results obtained in geography and history.

When we tried to "develop" definite ideas and produce "sharp" mental pictures, there was an amount of "fog" in the minds of our pupils that was very discouraging.

We needed something to "clarify," "fix," and "intensify" the impressions made in our teaching.

The location of places, the movements of armies, the various belts of vegetation, etc., etc., either faded entirely from memory or appeared in a dim haze when examination day came.

The maps, etc., in our school histories—small and failing to show the relations of places to the country at large—rendered but little service; and our wall maps—full of names—were comparatively useless as a means of testing the thoroughness of pupil's work.

It was an easy matter for a bright boy with good eyes to

step to the map when his geographical knowledge was questioned, point to the particular name in question, and then take his seat with a self-satisfied air and dismiss the matter from his mind. Three days afterward, if called on for the same thing, the chances were ten to one that he had forgotten it entirely.

This state of things was discouraging, and various attempts were made to secure better results. Map-drawing was tried, but the many crooks and turns of intricate coast lines took up so much precious time, and so taxed the eyes of both pupils and teachers, that the remedy seemed worse than the disease. Map *sketching* was better in some respects, but often gave us such abortions as to be scarcely recognizable.

The aid of photography was next invoked. Lantern-slides of the various countries, etc., were bought or made; and, taking a magic lantern, similar to the Acme Sciopticon made by Scovill & Adams, we repaired to the school-house at nightfall. After passing an eraser full of chalk dust over the blackboard we projected on it the various maps needed in our work.

The *outlines alone* were traced in chalk, and left till daylight. Some dark paint and a camel's-hair brush rendered these permanent next day. The board was as good as ever for ordinary work, and when the time came for recitation in geography or history, a few seconds sufficed to trace the outlined map, and we were ready for work. No names, no rivers, no mountains were there to help the lazy pupil who had failed to make faithful preparation. He was obliged to fill in these things, unaided, in the presence of the class, and subject to the scrutiny and criticism of both teacher and classmates. A new impetus was given to study, much drudgery was saved, and a permanent and effective means was provided to expose the shallow pretender, to encourage the diligent, and to instruct all.

Photography gave us also very material aid in another, though similar, line—the making of charts on muslin as a help to study in physical geography.

The ordinary maps in our school geographies are too crowded to be of the greatest value for educational purposes. The names of countries, rivers, mountains, plants and animals form a bewildering maze, and fail to make definite impressions. The only way to secure definiteness is to bring one thing at a time before the mind—showing it in its proper relations to other things—and then to drill upon it until it is fixed.

To do this in this subject required the preparation of a

series of charts large enough to be seen from the most distant part of the school-room and containing nothing foreign to the topic in hand.

Recourse was again had to the camera and the magic lantern. Bleached sheeting of suitable size was obtained, and the outline of the continent, etc., to be studied was traced upon it with chalk—*white* is best—together with whatever was desired for study.

Then in daylight this matter was traced over with a shading pen filled with Higgins's water-proof ink. As a result we had charts, large and accurate, and containing no irrelevant matter.

Thus, thanks to photography, our school is equipped with twenty-five or thirty permanent blackboard maps, invisible but ready for use at a minute's notice, and also a series of charts, invaluable for school-room use, and larger, better and far cheaper than any that we could have bought. The fact is there are none to be had in the market. They are highly appreciated by our teachers, and many pupils who have left us to enter higher schools have borne testimony to the benefit derived from them.

Verily photography is an efficient helper.

S. A. Espey.

THE FALLACIES OF PHOTOGRAPHY.

We are inclined to regard the record of the camera with the greatest confidence, and are apt to insist upon its results as an unfailing index of facts. While the erroneous impressions produced by the camera have often been dwelt upon, it is useful again and again to call attention to the very misleading inferences photographic work justifies. In reality the camera very largely can be made to say what the operator wishes to make it say. The *deus ex machina* is the skillful manipulator behind the head-cloth, who so arranges his viewpoint and adjusts his lenses as to make mountains out of molehills, and to reduce to fly-spots the imposing Alps.

Optical aberration to some extent falsifies relations, and although the familiar distortion of the feet and hands of the modest sitter has, by recent improvements in glasses, been brought within the limits of a reasonable reference to the rest of the person, yet optical illusions may still prevail and leave very false notions of the exact state of things Much or some

of such optical obliquity can be amended by care in the operator, or again, as I have said above, can be ingeniously exaggerated by that same omniscient agency. I have before me at this moment a very excellent panoramic view, made by an amateur friend, of the mountain region back of Seal Harbor, on Mount Desert Island, and it illustrates in a degree the misleading effects of photographic representation. The view is of a fresh-water pond inclosed between two longitudinal ranges and walled in at its further extremity by two round hills, while the foreground of the view was a rather flat or slightly curved dome of morainal drift. Being produced in a panoramic view, though the effect would be very similar in a single picture, the longitudinal ranges are thrown out laterally and appear as a straight ridge interrupted by the pond, while the flat mound is domed or rounded upward from right to left, and this effect could have been reversed and the mound made a concave instead of a convex curve, owing to varying elevations of the camera. The effect is misleading. The ranges in question were not and could not be so foreshortened under the circumstances as to give the proper perspective.

Take another amusing incident. Some years past many of us remember seeing a view of Index Rock, towering at a great height far into the sky. Some years afterward when our old friend, Mr. T. C. Roche, was doing the Rockies photographically, he made inquiries in reference to the location of that towering spire. Securing two faithful guides, after much painful scrambling, they reached the much coveted spot. "Where?" spoke our esteemed friend. "There," shouted the two guides, and before them the astonished visitor saw a rock not much higher than himself. This grand monolith whose picturesque beauty and fine proportions had awakened the applause of lecture rooms, was thus suddenly reduced to an inconspicuous affair of six feet? He saw the deception at a glance. Former photographers had placed their cameras on the ground quite near the insignificant rock and by inclining them in a proper position upward, had made it appear as a lofty pinnacle. Mr. Roche enjoyed the opportunity of repeating the exploit of other illustrators, but in his disgust, destroyed the chances of further deception, by rolling the fragment off the precipice; a rather forcible and certainly very effective means of suppressing misrepresentation. And so Index Rock passed into history. I have been guilty perhaps of partial misrepresentation in views taken near the walls of the Fox Island granite quarries, in a similar manner. Now it

is obvious that such conditions can always be found or made by which the details and the general effects of pictures can be greatly exaggerated, and it is also inevitable that the limitations of photography will themselves introduce errors. It seems to me that it is the duty of the photographer to avoid enhancing such effects by any voluntary invention or device. He should try to give proportions as he sees them, though occasionally for purely pictorial sensation he may take advantage of this optical law.

Lucien C. Laudy.

PHOTOGRAPHERS AND SOCIETY.

In looking up a subject to write upon for your valuable Annual and reviewing the past year's work, my mind wandered back to the Canadian Photographers' Convention of 1892, and of the papers read, and the discussions thereon. One of these papers, the production of Mr. Cunningham, our Vice-President, was in relation to skilled labor, and how to regulate the same. When the discussions of this paper were on the floor it was proposed to get legislation to aid photography, as for medicine and physicians, and to protect our trade, and have a corporate body to make rules and regulations to govern the profession. I don't know that the Legislature would do us any good, or that it would help us in the matter, but if the leading men of the fraternity, with as many of us lesser lights as would, were to organize a society and form laws and plan out a scheme for regulating us, and for the better advancement of our calling, I think the balance of power would be glad to fall into line when they saw that it was to their advantage to do so. The society could be made world-wide through the several photo societies working in conjunction with one another. In the first place we are troubled a good deal with any amount of cadgers, who ramble the country over, working a number of plans to gull the public, which of course greatly helps to lower our profession. Copying agents, crayon workers, ticket agents, and a thousand and one other agents who interfere with legitimate trade through their dishonest acts, and have no scruples to gull the public right and left. Then there are that class of workmen who seeking employment (always first-class, of course), and the employer only finds it out to his cost at the week or month's end that he is not the capable man he represented himself to be. Now why could not there be a society

formed whose objects would be in that line of protection, by, say, having a Board of Examiners, who would grade and certificate every one who would be a member, employer and employees to come under the same rules, employers only employing those who are certificated members, with a view of building up the society. Then, as I said, when those that could not see through it at the time, when they saw the advantages gained, would be glad to avail themselves of the privileges and protection of such a society. You will inquire, of course, where the protection would be in that? Well, in this way, the society would pledge themselves to employ none but certified labor, and if you like, grade the wage according to skill, as that is done anyway, so that when employment is offered one could advertise grade A, B, or C, or if one presented his certificate to an employer he would see at once what he was employing. The business men should be graded likewise to show that such a tradesman is in good standing, and has the recognized authority as to skill, etc., by the Photographic College of Artists or Board of Examiners, or what other name we should adopt. So much for that. Then those others, copyists and crayon workers, and other traveling agents could be dealt with.

The local photographers, seeing that advertisements in the local papers were placed so as to catch the public's eye, setting forth the reliability of only those traveling with certificates, so that if I should call on a party soliciting trade I could show my certificate as to skill and an authorized and recognized fellow craftsman. The public would have more confidence in placing orders; it would be better for the trade generally in that the public would have the recommendation of the society, and it being well advertised they would be made aware that confidence could only be placed in such certified men. Now I am aware there would be considerable kicking all over the United States and Canada at the start, but I think when once started surely the professionals would all fall into the idea to protect themselves.

As before stated, it was suggested that we organize and get legislation, such as the M.D.s, to get power to act as they, and grant licenses, to stop those practicing who would be unlicensed, but I think that would be difficult to do, in fact the thought cannot be entertained as it would not work that I can see. We would have a difficulty in getting our corporate fathers to see the need in our case to grant such powers. But we have the power within ourselves, if we only go about it in the right way. It need not cost very much to run a society

of this kind; it could be made to work through our conventions. I hope this will catch the eye and thought of our best men, and that at our next convention this might be ventilated fully, so that the feeling of the representatives of the professions would be known and some action taken in the matter, as these are only suggestions.

I think that our conventions would be more interesting if subjects of this and kindred thought were taken up, and drop the glamour for prizes that signify nothing, and take up the thought of the better advancement of photography and photographers. The prize business is sapping the life of our conventions, as favorites get the prizes and the others go home discouraged, never to go back again; whereas, if that was done away with and more interest paid to technics, more good would be accomplished. Let every member be expected to bring an exhibit of his work, not for competition but for comparison and instruction, the poorest will no doubt have some point of interest for others to study, and we can give and take in this matter. Why should there be so much secrecy one with another? This may have been all right in Daguerre's time, but not now; we are advancing, then why hide that that will help others and advance the trade? Jones in Chicago cannot hurt Smith in Montreal, neither can Black, of New York, Brown of California; then if we are amalgamated as a society why not give and take aid? Conventions of this type would be more instructive, and I am sure all the members would go home feeling repaid for the time and money spent in attending such conventions; not having the remark made, as is often the case: "Well, I spent $15 or $20 attending a —— convention, but I cannot say that I got any benefit from it."

J. A. Lord.

RE-DEVELOPMENT OF DRY PLATES.

It often becomes necessary, even for the best or most expert operator, to improve the printing quality of a negative by re-development, to increase its strength or intensity. Methods for performing this operation on wet plates were numerous and common and results excellent; with the dry plate, however, it has been quite another thing, but we will get there just the same.

I have always been on the lookout for methods of dry plate intensification and have given all the different formulas that have come to my knwledge a fair trial, but have not been

quite satisfied with any, although I note a decided progress toward the end sought for.

The latest formula that I have used was published during the past year in one of the journals devoted to our art, and comes nearer to what we want than any other that has come under my notice. I allude to the use of mercury and a re-development by the ordinary hydroquinone developer.

It is the common practice among photographers everywhere to intensify with mercury or with a combination of mercury and iodide of potassium, with the result that the negative is uniformly strengthened over all its surface and no change in the balance of printing quality has been obtained. By subjecting the plate to the action of the mercury and then re-developing with hydroquinone we get very nearly the same results as if the plate had been properly developed in the first instance; the hydroquinone developer seems to bring up the lights in their proper ratio and the correct balance of light and shade is secured with the possibility of getting about the amount of additional intensity required.

I have made some little change in the formula as published and offer my suggestions for what they are worth.

I use a solution of mercury of moderate strength so that it shall act slowly and allow the plate to take up more or less of it according to the amount of intensification desired.

If the plate is very thin and needs much added strength, I wet the plate carefully so as to avoid air-bells, when it is placed in the mercuric solution where I keep it in motion until the image first disappears and then comes again brightly to the surface, when I remove it from the mercury and wash the surface free from every trace of the solution.

The plate is now taken to the strongest light (bright sunlight is the best) and placed in a developing dish and covered with fresh hydroquinone developer (any formula), and in a short time the appearance and character of the plate will be completely and entirely changed and the negative comes out with very little to be desired, and also with an increased stability and permanent quality that have been so lacking in other methods of mercuric intensification.

As I have stated before with this formula, the additional strength required is governed by the amount of mercury the negative is permitted to take up, so that if it is desired to secure only a very little increase of intensity the negative is left in the mercuric solution only until the surface is whitened.

It is important and very necessary that the plate should

have been washed free from any traces of hypo. If there remains any doubt about it, soak the plate for a short time in a strong solution of common salt, then rinse well before using the mercury; this will prevent the film turning yellow during the process. After development, wash again, and use a tuft of cotton to remove any surface deposit.

I shall be greatly pleased if this formula helps any fellow laborer to save a negative that otherwise might have been considered as n. g., as I hope to get many valuable hints from the contributions of others to THE ANNUAL this year.

E. M. Estabrooke.

HISTORICAL PHOTOGRAPHY.

AS THE photographic objective is the monarch of all scientific instruments, so may the modern sensitive dry-plate well be called the retina of science. Every branch of scientific study and research is now more or less dependent on photography.

Next to astronomy, history has perhaps the greatest hold upon the art-science and its attendant reproduction process. Photography offers the greatest assistance to the student of history; be it of the past, present or future, it is a fact recognized by all the great educators who make that branch of study a specialty.

In the department of history, applied photography does not merely furnish a record of passing events, but helps to unravel many of the obscure questions of the past, and brings before us the features of often long-forgotten actors of days gone by in a manner that they may be distributed for comparison and study, while the possibilities of the future are too great even to speculate upon.

It has been charged against photography that the results obtained are but ephemeral, a charge which, except where albumen prints are depended upon to form the historical record or album, falls to the ground in the face of the platinum processes of the present day.

The question of permanency being disposed of, it now but remains to apply the process in its widest sense, and thereby build up enduring monuments for generations to come. This can be done by individuals: (1) by systematically photographing such landmarks, historical buildings, and other objects of the olden time as are still in existence in their locality; (2) by photographs of passing events of general interest; (3) by photographs of local life and character; (4) by preparing lantern-slides for lectures on localities rich in historical lore.

An album, say of fifty to one hundred of each of the first three of above subjects if printed in platinum and properly mounted and annotated, would, twenty-five or fifty years hence, say within the lifetime of the compiler, be well worth fifty times the cost of production. So much for individual effort.

In places where exists a historical society or camera club, the scheme would prove of still greater scope, as by a combined effort of the members much greater results might be achieved, which would prove of incalculable benefit to succeeding generations. It should be as much a matter of pride for the officers and members of a photographic society to possess a photographic survey of their town or locality as it is for other scientific organizations to maintain museums and collections of specimens illustrating their particular branch of the liberal arts or sciences.

Yet how few of the vast number of photographic societies and camera clubs scattered throughout the land are able to show even specimens of photography illustrating the progress of the art. The writer will venture to say that not one out of fifty could show even a single specimen of the daguerreotype, to say nothing of the talbotype. Strange as it may seem, the organizations and persons who mostly recognize the value of photography in historical research are individuals who have no connection with the local camera clubs or photographic societies.

One of the first of the larger institutions in America to recognize the possibilities of photography in connection with historical research and study, was the Historical Society of Pennsylvania, where arrangements were made so that negatives of rare prints and portraits could be made without running the risk of injury to the originals, all the work being done within the building of the society. Then again arrangements were made to properly assort and classify such prints as should be given to or acquired by the society.

One of the first outcomes of this movement was the production of a series of Washington portraits, including every known authentic portrait of the illustrious original. The heads of the negatives were all made of the same size from the original canvas, miniature or drawing whenever available, or, if that could not be reached, the best engraving of that distinctive portrait was selected. In addition to this series, a number of studies were made from a cast of the life mask taken by Houdon in 1785, which was virtually the same as photographing the "Father of the Country" from life.

This series of prints was reproduced of a uniform size, so that the eye could the better compare the features and trace his countenance successively; the effect of the worries of military life, the cares of State, the beneficial results of rural retirement, and the inroads made by growing age; the collection of prints forming a graphic history of America's most heroic character during the most important period of his life.

Another interesting application of historical photography is a set of portrait slides made for the University of Pennsylvania, from originals at the Historical Society, showing the portraits of all prominent men connected with the framing of the Constitution in 1787, at or about the time when the Convention was in session, for use in a lecture on the "Framing of the Federal Constitution."

Leaving the past and coming to the present age of steam, electricity, and photography, most all of the scenes and incidents which crowd each other in the present age are worthy of preservation in a graphic form, and it should be the ambition of every professional and amateur when he secures a negative of prominent men or incident to place at least one copy on permanent record. A systematic action of this kind throughout the country would bring together a wealth of material of incalcuable value for future use.

What photographic clubs or societies will be the first to move in the matter?

Julius F. Sachse.

AN IRON WASHING TANK.

A VERY essential part of the production of good photographs is the washing of the prints, before toning, to dispose of the free nitrate of silver and, finally, to remove all traces of hyposulphite.

There are various tanks and trays for this purpose for sale by the stock houses; but comparatively few photographers buy them, whether owing to high cost or impracticability is difficult to determine. Most workers get up something themselves. In small establishments wooden trays lined with oil-cloth or coated with tar are used and each change of water emptied out at once. In other places fixed wooden sinks or tubs with water constantly running through and sometimes arranged to syphon off at regular intervals.

The writer had occasion a few months ago to get up a washing tank in a short space of time, one that would handle from

twenty to forty sheets of paper at a time was needed. The space it must occupy was limited. A wooden sink was considered, but rejected, because the wood so soon becomes saturated with water and chemicals. A round zinc tank was next thought of but the space would not admit of one large enough for the purpose. A zinc-lined iron sink was then almost decided upon as it exactly fitted the space, and had several apparent advantages, but was given up for the sake of trying an experiment with a common iron sink. A cheap sink was selected three and a half feet long and of good depth. A lead waste pipe was attached in the ordinary way and a rubber hose connected, which can be raised or lowered at outflow end so as to govern depth of water in sink; by this means the sink can be kept full or at any required height. The water flows in at the upper end of sink through a hose attached to a faucet; this insures a smooth stream and may be given any direction, thus keeping the print in motion and separated.* After these details were arranged the sink was painted inside and out with asphaltum paint.

After two changes of water in a tray to save the silver, the prints were placed in the sink and the water turned on. The prints are returned to the sink again after toning and again after fixing, for the final washing. During two or three trials some of the prints would be spotted with rusty spots, probably because the iron was not thoroughly covered, as only one coat of paint was used. Perhaps another coat or two would have remedied this difficulty; but parafine was used instead and the spots disappeared. The parafine is melted and applied with a brush; it immediately hardens and the sink can be used in five minutes. It is well to recoat it, say once a month, as the iron must be thoroughly covered, else rusty spots will appear on the prints.

It was thought best at first to syphon off the water, but the prints curl and are likely to get broken and blister, so a steady stream is kept running through. This washes them thoroughly, if the prints are handled and turned over several times to keep them separated. This should be done in any case.

This tank is not recommended as better than any other, but is inexpensive and has given great satisfaction. There is no reason why it need not last a lifetime by simply recoating occasionally with parafine.

E. B. Luce.

* A perforated zinc partition is placed across the sink just above the waste pipe. This effectually prevents the prints from being sucked down, thus stopping the outlet.

IF.

If you would have an excellent paste for mounting prints, put a little white glue into the required amount of water, let it soak an hour or two, heat, and stir in *corn* starch, dissolved in a little water. Do *not* cook until it is clear, but leave it a little whitish, stir until cool and you will have a smooth, clear paste, that will hold the print to the mount.

If, for any reason, you wish to remove the print from the mount, you can do so easily, by soaking it in water, if the above paste is used.

If you are bothered while mounting prints on gelatine paper, in hot weather, by emulsion getting soft and sticky, catching every particle of dust, just make a light frame a little wider than the length of your print-roller, or mounter, and suitable length for your needs, upon which tack a piece of bleached muslin—after washing out the starch—stretching it tightly while damp, lay this over the prints when placed on the mounts, and pass over all, the roller. Keep the cloth clean and damp with a wet sponge. Result, clean prints.

If you want a better way to dispose of your mounted cabinets than to spread them all over the table or floor, while they are drying (you know you can't put mounted prints on each other while damp, especially if on gelatine paper) get some pieces of boards about 1¼ inches thick, say 5 inches wide, and suitable length to be handy. Saw grooves across one side, about one-half inch deep, and one-half or three-quarter inch apart; place the bottom end of the cabinets in these grooves—the faces all one way—as you remove them from the mounting table. In this way the prints will dry quickly, do not stick together or catch the dust, and takes up but little room.

If you would have a developer that requires very short exposures and gives good detail all through, try amidol. My way to use it is:

Solution A.

Water	16 ounces
Sulphite soda, crys	4 ounces

Developer.

Solution A	½ to ½ ounce
Amidol, dry	2 to 4 grains
Water	1½ ounces

A few drops of 1 per cent. bromide potassium solution.

With a little wood or bone spoon, dip out and weigh from 1 to 4 grains of amidol; after this you can easily guess

the proper amount to use, remembering, the more amidol the stronger, the more solution A the softer, the negative.

This developer can be used repeatedly, adding a little amidol, etc., as is needed, varying the proportions according to the results desired. With this developer and No. 26 plates no baby can get away from me.

If you are not successful in the use of gelatine papers, try some of the collodion papers. There is a kind that does not curl, tones and fixes beautifully, in combined bath, without previous washing, any desired tone. Results, satisfactory, every way. See advertising pages of the journals.

If you wish to keep posted and up with the times (*The Photographic Times*), take and read one or more of the journals of your profession.

If you know any better way to do the above things, tell us in next year's Annual.

A. J. Whalen.

SOME FACTS OF A CHEMICAL NATURE USEFUL TO THE AMATEUR.

From the earliest times when man, the child of nature, worshiped at nature's mystic shrine and beheld with wondering eyes the disclosure of her more common truths—the secrets which she gradually reveals to the studious—to the time within the memory of men now living, chemical laws have continually attracted the attention of mankind.

By the wonderful changes which these produce in animate and inanimate nature the alchemist of yore sought to prepare the "Elixir of Perpetual Youth" and the "Philosophers' Stone," thus attempting to produce from material things things as unreal, as unnatural as it is for a Mohammedan to doubt the story of the suspended coffin, or a Christian to deny the tenets of his faith.

Astrology and alchemy as practiced in the dark ages through incantations, weird scenes and simple chemical experiments have imparted undue significance to chemistry and its laws, until even to the present time anything produced chemically, be it powder, crystal or liquid, is looked on with suspicion.

The amateur who has recently purchased his outfit looks on these very chemicals with distrust, or as the producers of results so wonderful he, perhaps, regards them with awe. Ignorance of natural laws which have existed since the crea-

tion, will also produce a like result, and it is to be deplored that the knowledge of these laws and those of chemistry is very limited among the average amateur.

A deficiency of this kind upon this, the most vital point, the very foundation of photography, is to the progressive amateur (who aims not at making a picture—for any one can do this—but at achieving the highest artistic result), it is very unfortunate when we remember that it is mainly to the intelligent amateur to whom we must look for the advancement of photography.

Even a minor course in chemistry is of incalculable benefit, and will work wonderful results in the quality of your work by suggesting the probable cause for bad results and the means for avoiding them in the future.

A fair knowledge of qualitative analysis is indispensable to the amateur, and more so to one of an excitable temperament and poor recollective powers, for how often are packages and bottles found unlabeled. Bottles are found full of crystals which have the same physical properties. They are white or colorless, soluble in water, to the untaught eye they seem to have the same crystalline form, they have the same taste, or perhaps their taste may be the only distinguishing characteristic. What are they?

As an example let it be supposed that we have found two salts which we have reason to believe are sodium sulphite and hyposulphite. We want to use one of them immediately. Which is which?

Take solutions of these two salts and treat them with a solution of sodium carbonate (1 in 10), and since they yield no precipitate they belong to the class of substances called alkalies.

They can be either sodium or potassium salts. This much being ascertained their flame reaction is next observed. It is done as follows:

First clean a piece of platinum wire having a loop on one end by heating in the flame of an alcohol lamp or Bunsen burner and plunging it into a dilute solution of hydrochloric acid; then reheat. If, by holding some of the dry salt or a drop of its solution on the loop in the flame of a Bunsen burner or alcohol lamp, a yellow flame results, it is a sodium salt, whereas, if a flame very similar to this is viewed through blue glass it will have a violet tinge if potassium is its metallic constituent. If a salt is found which gives a soluble carbonate upon treatment with sodium carbonate, and no color

reaction the salt is probably an ammonium salt. For further proof of this treat a solution of the salt with caustic soda, when, on heating, vapors of ammonia will arise.

It sometimes happens that no Bunsen burner is available and the alcohol flame is yellow. In this case a colorless flame may be obtained by treating zinc with dilute sulphuric acid (1 in 5). Hydrogen is evolved. A simple apparatus to produce and burn this gas is made as follows:

Procure a wide-mouth bottle, and having bored two holes in the cork, insert two glass tubes.

In the end of one tube melt a piece of platinum foil rolled in the form of a tube, while on the end of the other tube blow a bulb, and while hot punch a hole in the top. Widen this hole by turning it around in the flame until a funnel-shaped end is formed.

The gas is now made by pouring dilute sulphuric acid through the funnel tube on to scraps of zinc in the bottle; then insert a parafine cork in the funnel tube to prevent the escape of gas at that end.

After sufficient time has elapsed ignite the gas coming from the platinum tip.

If fire is applied too soon an explosion will result. To avoid this do not use too large a bottle (about four or five ounces), and do not hurry. A platinum tip must be used to obtain a colorless flame. The gas will burn better if it is passed through a tube containing calcium chloride.

In the above methods I have endeavored to show how by qualitative analysis we can determine the metal of a salt. The next step is to determine the acid.

There are various methods for determining the acids of different salts, but as we have begun the analysis of two salts supposed to be sodium sulphite and hyposulphite, I will attempt to show how these salts may be distinguished from each other by an analysis of their acids.

In the first stage of the reaction when crystals of sodium hyposulphite are treated with concentrated sulphuric acid, there is an evolution of a gas, hydrogen sulphide, (H_2S) which has the odor of rotten eggs. It may be detected by placing a silver coin over the mouth of the test-tube when there will be found on the surface of the coin a black deposit of silver sulphide.

Following the evolution of this gas, another gas sulphur dioxide (SO_2) is given off which has a suffocating odor and is always noticed when a sulphur match is ignited. At the close

of the reaction the solution in the test-tube will be seen to have a milky appearance. This is a deposit of sulphur which is formed by the breaking down of thiosulphuric acid. The acid formed when sodium hyposulphite is treated with sulphuric acid.

This milky appearance or precipitate of sulphur distinguishes the hyposulphite from the sulphite.

By treatment of sodium sulphite with concentrated sulphuric acid we get only sulphur dioxide (SO_2) with no precipitate of sulphur. Therefore, if by the treatment of two unknown salts with concentrated sulphuric acid you observe the above reactions you can feel quite certain that they are sodium sulphite and hyposulphite, for with the same salts, the same reagents and under the same conditions, the same chemical reactions are inevitable.

It is, probably, not universally known among amateurs that old blue print paper may be made to yield as good prints as when newly made simply by exposing the paper to vapors of ammonia. When the darkened surface turns a bright yellow the paper is ready for printing.

Old hypo baths should be saved and the silver extracted by treating them with potassium or hydrogen sulphide. Black silver sulphide is precipitated. This should be thoroughly washed and exposed in a crucible to a white heat. The sulphur will be expelled and the silver remain.

Old toning baths and print washings should be collected in another vessel and treated with common salt. A white precipitate of silver chloride is formed which may be reduced to metallic silver as follows:

Thoroughly wash the precipitate and place it in a porcelain vessel, then cover the precipitate with a piece of zinc and add enough water to cover all.

After adding a few drops of sulphuric acid set aside for a few days. The sulphuric acid will attack the zinc with the evolution of hydrogen and this hydrogen being in a nascent state in contact with the chloride attacks the same with the formation of hydrochloric acid and the deposition of metallic silver in the form of a grayish, black powder.

By heating this powder in a crucible or on charcoal in the flame of an oxyhydrogen blow pipe it may be reduced to a metallic bead.

But this is useless, for the powder itself may be converted into silver nitrate by treating with nitric acid, evaporating to dryness over a water bath to drive off an excess of nitric acid,

and after dissolving in water, evaporate to crystallization. The crystals should be kept in a colored bottle in the darkest corner of the dark-room.

Fellow amateurs, do not fail to make yourself better acquainted with chemical laws, and although your pursuit of photography is for pleasure only, pursue it intelligently. By all means be not content with "rule of thumb" methods.

Now, in conclusion, let me state that my sole motive for writing this article was not so much to try to give something new, for "there is nothing new under the sun," but by presenting chemical facts useful to the amateur, to show the relation of chemistry to photography and to stimulate experimental photography, thereby promoting its advancement. If by this feeble attempt I shall have aroused a spirit of investigation in some breast, my object shall have been achieved.

E. L. Bowlus.

TAKE A CAMERA WITH YOU.

If you are about starting on a journey and do not happen to possess a favorite camera, search until you find one that meets your requirements and take it with you.

If you do not happen to know much about any camera, go to some reliable dealer—friend Scovill, for instance—and learn all about the advantages of this box or that box, the merits of this lens or that lens, why films are better than plates for the itinerant or *vice versa*, and, after you have listened to it all, buy the camera which most suits your judgment and take it with you.

You will find it an unfailing source of pleasure, not only while you are taking it with you, but also after you have brought it back and have developed and finished the exposures you made wherever you took it.

A photographic record of a pleasure jaunt, a business trip, or a vacation tour, is the best record a man can keep, and is the most charming form of diary to read and re-read over and over again.

It enables you to retain an unfading impression (if your plates and prints are well washed and free from hypo) of many pretty scenes which would otherwise lose their distinctness.

It helps you to perpetuate many memories which would otherwise be short-lived.

I am writing this in a leafy eyrie overlooking the prettiest village that nestles on the banks of the Hudson; the noble river winds with mighty sweep around the base of old Dunderburg and stretches away toward the sea; the bordering hills fade into the distance, getting bluer and bluer, until they are lost in the deeper blue of the sky.

Amid such scenes as this you always want a camera with you—so think the two who have just come into my range of vision at the top of yonder sloping rock; she all in white, from the ferrule of her dainty parasol to the toe of her tiny slipper; he all admiration, all devotion.

In this case I am all-seeing, but unseen. He has brought his camera with him—a Waterbury it looks like from this distance.

Now she is posing for him, first sitting, then standing in numberless pretty attitudes, and now leaning against that convenient tree that plays such an important part as an accessory, but always for him, who was thoughtful enough to bring his camera with him.

His plates are exhausted; he has taken her in many ways, and when he has finished she is taken gently in his arms and he is given full payment in a coin that is always current and never below par. I am a compulsory spectator and dare not move lest I disturb them, but I am trying hard to look the other way.

Imagine them years hence (for, as I know, he is a practical chemist and is careful in his manipulations, I feel certain that his prints will not fade) looking over the results of the click, click, click of that shutter.

If you go to the World's Fair at Chicago, or if you go with any of the world's fair wandering about the woods, by all means take a camera with you.

If you take it on a prolonged fishing excursion, you will be able to prove to your friends, on your return, that your stories are not all vain boastings; if you take it to your favorite summer resort you can photograph your conquests as fast as they are made; if you take it on your tramps or on your boating trips, among the mountains or to the seashore, you will find it a faithful story-teller, a pleasant companion that will give you many moments of joy while you are away and after you return.

A 4 x 5 hand-camera is as easy to carry as a small satchel, and is large enough for the beginner to spoil his first plates with.

"It's only a straw, but"—when you select your instrument choose the work of a reliable manufacturer, giving particular attention to the lens; and when you get it take it with you, in the morning, at mid-day, and in the evening, before meals, after meals, between meals, make it your confident and friend, and always take it with you.

Edward Manser.

THE CHAUTAUQUA SCHOOL OF PHOTOGRAPHY.

This school instructs in the theory and practice of the art-science; it is of a peculiar kind, and probably cannot be compared with any institution for similar purposes. When first established, the idea intended was to train scholars for professional work exclusively, but circumstances have been active enough to make it what it is at present, a resort of instruction in the widest sense of the word for professional and amateur alike. The earliest applications to join were made by amateurs, ladies and gentlemen, and only after the second year of the school's existence a call was made by a young lady to receive instruction in portraiture, who, by the way, carries on now a very successful business in South America. Many others have afterwards taken the same course, but they are in the minority, the greater number of the eight hundred men and women instructed during eight years pursue photography as amateurs only.

The Chautauqua Association had made it incumbent upon the instructor to form corresponding classes, immediately after the first session of the school on the Assembly grounds, to be carried on in the same manner as those of the college of liberal arts and the literary and scientific circle. Whoever conceived the idea of instructing photography by correspondence, must have known very little about what that means, else he would have foreseen the almost insurmountable difficulties that afterwards really did present themselves. But circumstances not controllable by the appointed instructor, and the novelty of the thing, gave enough stimulus to try, and it must be said, if we can believe the words of people of authority, and if we can trust our own eye and judgment, the experiment made resulted in signal success.

Many insufficiently informed people are still doubtful of what the corresponding class has accomplished; others again

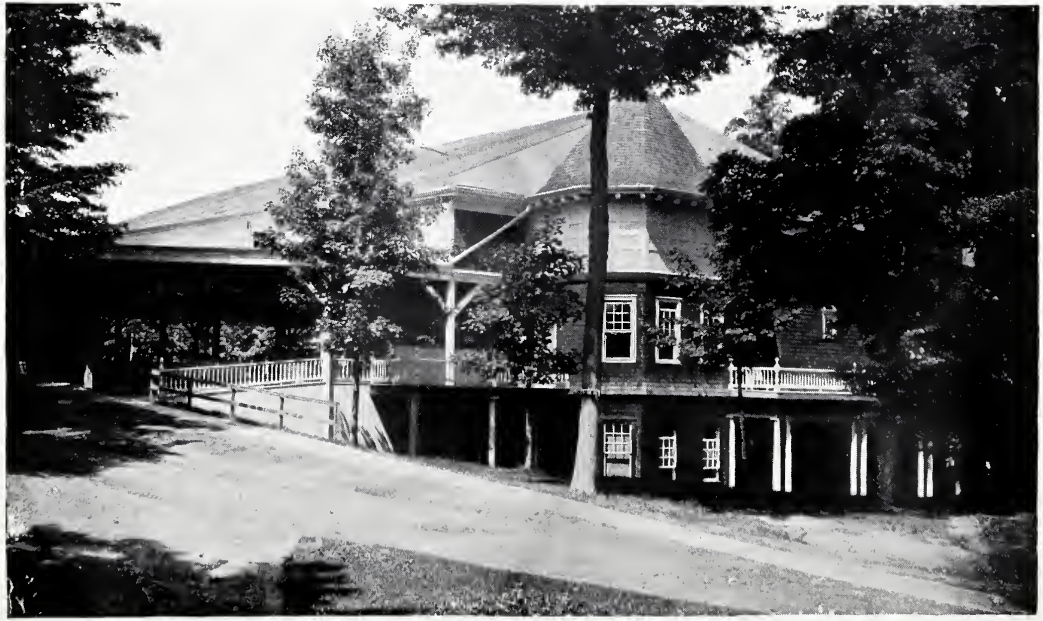
cannot conceive how it is possible to instruct in photography by correspondence. If the skeptics of the first named would pay a visit to the Assembly grounds when the School of Photography holds its annual exhibition, they would find the great majority of pictures displayed to equal and often surpass the productions of amateur societies; and for the benefit of the others, I will endeavor to give an outline of our method of instruction.

The applicants for admission to the corresponding class are of various kinds. A great many of them are totally ignorant of how a photograph is made when they enter. With them it is comparatively easy to work. They rely with confidence upon the instructor's advice, work diligently and intelligently, and success is a certainty almost with them.

There is another class of people, who by dint of flaming advertisements, and because photography is a fashionable sport, have purchased apparatus, hand cameras in most cases, and who have been told by the dealer, all that is necessary to produce excellent photographs is to pull a string, detach a lever, or to press a button attached to the camera. After having experimented for a year or so, and after spending a lot of money for plates, films and all sorts of developing solutions without making a picture at all, they come ultimately to the corresponding class, not like those first mentioned, but full of preconceived ideas, and disgusted to some extent with instrument and with themselves because of their failures. These people are the most difficult to deal with, and but rarely have we been able to find among them one who turned out a credit to the school.

The third class of applicants, the most numerous perhaps, and the most gratifying to the instructor, comprise those possessors of good and serviceable apparatus, and who by self-instruction, by the reading of good hand-books, and frequently with the aid of a more advanced amateur, have attained to a certain proficiency, but encounter constantly a multitude of failures and difficulties which to explain by themselves seems to be impossible.

They come to the class with the distinct desire to learn, to be informed on special points, to learn different methods, negative and positive as well, to be instructed in posing and lighting the subject, to be told of the causes of failures, of the merits or demerits of certain chemicals, objectives, plates or printing papers. They are eager to learn and to improve, and it is a pleasure to instruct them.



THE NEW AMPHITHEATRE, CHAUTAUQUA.—EXTERIOR.

In all the subordinate classes we have a set of printed lessons on the rudiments of photography. They are sent to the students of the Corresponding Class, one every week. Those of other classes receive them, several numbers at a time, at the option of the instructor. There is furthermore a well-authenticated text-book ("Burton and Pringle Processes of Pure Photography"), giving additional instruction and serving as a sort of reference. *The Photographic Times* supplies reports on the novelties in photography, and the student is required to send specimens of his work as soon as he is able to do so.

When a beginner applies for admission we select for him apparatus to suit circumstances. We ordinarily begin with the "favorite outfit" of A or B denomination, or with the reliable Waterbury hand camera, when to make snap shots is the desire of the applicants. In either case a full description is given of the instrument and how to use it.

Lens, camera, sliding front, swing back, stops, tripod, in fact every part of the instrument is described in detail, the parts are numbered and their functions explained. The first lessons tell of the treatment of the sensitive plate, the compounding of the developer and how to bring forth, with its aid, the negative image. Subsequent operations are also described in the lessons.

After receiving apparatus and reading the first eight lessons, the young photographer begins to work with variable success, presents to the instructor what he has done, and instruction by correspondence begins now in earnest. Invariably the first negatives are of poor quality, and every fault or defect in them is pointed out, with the result of better work with the next negatives received, and thus we go on and on with continuing success in the majority of cases.

Of all beginners admitted about 60 per cent. turn out to be average good photographers, 20 per cent. are for reasons better not stated always working and studying without success, and the other 20 per cent. are of "you press the button" order.

Pleasant and gratifying as it is to work with beginners, it is much more so with those tolerably well advanced, and who have joined the class to improve and to learn more. They are generally more advanced in years than those of the other classes, among whom we count many young folks, and are cultured people. Criticism pronounced on their work is taken good humoredly, if a bitter pill is returned to them for the

picture offered. But as criticism is intended to be part of the instruction, it is invariably severe and just, we hope. It is highly interesting to correspond with these people; the questions asked by them are clear, distinct and to the point, and, although oftentimes the most abject ignorance is manifested, they are always cheerfully answered and in detail. The answers to these letters, the "Query" column in *The Photographic Times* and its Chautauqua Supplement, is considered by our students a great source of information.

The practicing class on the Assembly grounds is advertised to be open about ten weeks every summer, but circumstances often abridge the time. As the name implies, instruction consists in supervising the work of the students. We practice in studio and field, and as it is a great desire to take home Chautauqua mementoes in the shape of photographs, much work is done, although not always of desired quality.

The winter or local class* is as it were an echo of the summer class, although a greater variety of work is done here. Plates exposed outdoors are developed and printed from by various methods. Much attention is paid to making of lantern slides, the reproducing of other pictures, and the photographing of inanimate objects. Some winters, the majority of students have practiced portraiture exclusively. Photomicrograms are made when called for, and photographic chemicals have also been prepared. After passing the course of instruction and having pursued the required reading, the student is admitted to examination; 80 per cent. of the questions correctly answered, and three good photographs presented, entitle the candidate to a Chautauqua diploma. As it is the purpose of the school to educate practical photographers, the instructor is not very rigorous in adjudging the 80 per cent., as long as the candidate's photographs are of unusually good quality.

After a diploma has been given to a student of any of the three subordinate classes he can be admitted to the advanced or post-graduate class. Instruction consists here in prescribed reading, and quarterly examination by letter. Our books are, besides *The Photographic Times* (the official organ of the school), "Jerome Harrison's Photographic Chemistry," a work on account of its clearness and simplicity, eminently well adapted for our scholars; it is read with much interest and benefit to scholars, for they readily understand what the

* The headquarters of the school are at 423 Broome Street, New York.

author says. Burton's "Optics," and Robinson's "Pictorial Effects in Photography," are studied with equal zeal.

The higher class may well be said to be the pride of the instructor and the Chautauqua authorities, but there are others, ex-members, who have faithfully adhered to us for years and who at every occasion show devotion to their photographic alma mater.

Charles Ehrmann.

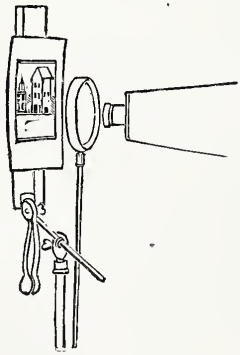
"ARE YOU SUCCESSFUL?"

Photography exacts more from its followers than almost any other business. To be successful one must be so in two ways. As a workman in the first place, and as a man of business in the second. These qualities are rarely to be found combined in one person, hence many fine workmen are doing but a light and indifferent business while many indifferent workmen are making money just because they have the knack of dealing with the public as business men. One of our leaders (Mr. A. Bogardus) has said that: "Only those are successful who succeed," which is not very encouraging to the photographer about to go into business and perhaps investing his little all. Unless a man is conceited he must know his failings better than anyone else, and knowing them he is not entitled to respect if he does not seek for and apply the remedy. To be successful as a workman one must be serious about his work, giving every small detail connected therewith due attention. By careful study of work which is superior to one's own, it is but a matter of time and patience until the desired results are obtained. If perplexed upon any point one should not hesitate to seek advice, as the days of mystery are long past. It is no disgrace to copy after others when the object is improvement. To be successful as a man of business, location and attractive quarters are of the first importance; with these two points in your favor it is only necessary to apply the golden rule in meeting and treating your customers, doing to them as you would have them do to you were you their customer. Discard your egotism, be polite, be modest, be truthful, give the required time to the business in hand, no more, no less, above all be prompt and have the work ready when promised. Don't run down your neighbor who may be doing better or just as good work as yourself, who may have the confidence of the people, whose residence covers more

time than your own, who may have more money. Seek to put yourself in touch with the people amongst whom you have pitched your tent but mind your own business.

Methods as applied to most kinds of mercantile business, such as clearing sales, red letter sales, bankrupt stock sales and other schemes too numerous to mention, should never be applied to photography as a business, no matter under what names. Do not stoop to the tactics of the cheap John, if you would have the respect and confidence of the public. Do not anticipate your business but make up your mind that it will take several years of hard work and close application to obtain a firm foothold. Photographers as a class are apt to neglect their health, but to be successful one must have good health, and it is only to be kept or regained by a fair amount of outdoor and physical exercise. Set apart a certain time each day for that purpose; if you can afford it buy a wheel, it is just the thing to exercise all of your muscles and carry oxygen to your blood. Don't think you are too old to learn to ride, the writer learned after his thirty-seventh birthday and has derived great benefit from it.

I will close this article with a description of a great help in copying extremely small objects and the management of a flash-light. There was brought to me an 8 x 10 view having in it the figures of two little girls, so small one could not form an opinion of what they looked like without a magnifying glass. Being the possessor of a 4½ inch hand-glass composed of two plano-convex lenses, mounted in one cell, with the convex surfaces turned in toward each other, I removed the handle and adjusted the lens on the small sliding rod of a music rack which permitted of the easy adjustment of the lens up or down. This lens I then interposed between the picture to be copied and the photo copying lens. By due care as to being at exact right angles with picture and copying lens and carefully cutting out all light from back of lens, I was enabled to obtain a negative much sharper than ordinarily possible and more than large enough for a cabinet, and besides, the copy did not have that rough effect from the grain of the paper. See illustration.



In flash-light work I use a Prosch Storage Lamp which I fasten

on the small rod of the above-mentioned music rack, to which another rod with sleeve and set screw is attached, upon which I use an ordinary glass reflector. In making an exposure I guide the reflector with one hand turning it slowly so as to send the light sweeping from one end of the subject to the other, and have in this way photographed a stage full of people at a distance of sixty feet, also a group of over eighty children full 8x10 with time to spare on the exposure.

Wishing my fellow photographers the best of success, I am, sincerely yours,

O. M. Pausch.

STAR SPECTRA AND COMMERCIAL PHOTOGRAPHIC PLATES.

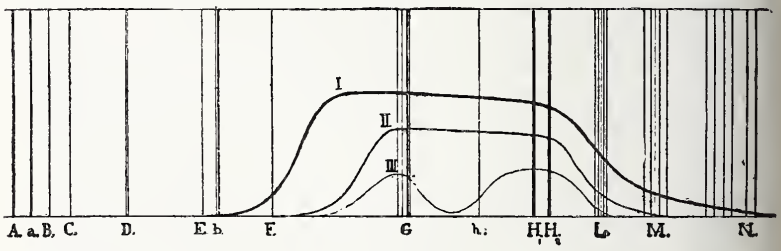
Ever since Astrophysicists have resorted to the aid of photography when making observations of star spectra, the ordinary photographic plates have proved to be defective, wanting in quality, namely, insufficient sensitiveness for cyan blue, and for green.

The Fraunhofer line F (486), and the regions surrounding remain unaffected in their observations, and with the enormous long exposure necessary, but a feeble, expressionless picture is produced. For that reason it has been preferred to use the ocular only for the examination of spectrum precincts and to limit the photographic picture to the more refrangible rays, —indigo, violet and ultra violet. The subjective spectrum, as seen with the ocular, is as far as to its reliability very much inferior to the photographic spectrum, and naturally it is therefore desired to see the sensitiveness of the photographic plate so much heightened as to reach those precincts, the more so as the line F of the stellar spectrum shows very extraordinary metamorphoses, of great interest to the astrophysicist. It is scarcely necessary to be reminded of the remarkable phenomena occurring with this line in the spectrum of Nova Auriga, observed by Mr. and Mrs. Huggins, Mr. Edward Pickering (Miss Maury) and others. Had these savants been able to fix these metamorphoses permanently upon the photographic plate, information for all time to come would have been deposited in unquestionable documents, not liable to be subjected to doubt as they are now set forth after the results obtained by observations with the ocular.

It has been asked whether the photographic plate employed

in stellar photography may not be made adaptable to more extensive observations, with better results than heretofore, so that in the future we may successfully photograph not only as far as the line Hγ but up to Hβ, and when we consider that by the addition of iodide of silver to the bromide of silver emulsion, the sensitiveness for cyan blue rays and for green is much increased, there appears to be no difficulties to answer the question affirmatively. Unfortunately it is but little known how the sensitiveness of a bromide of silver gelatine emulsion increases by adding to it *a small* percentage of iodide of silver, not only in sensitiveness for the brighter optical rays, but also in general sensitiveness.

If two emulsions are made, one of pure bromide of silver, the other also of bromide of silver, but with a modicum of iodide of silver added, the latter will be found to give excellent pictures up to the region of F, while those of the other are but feeble and weak. As the behavior of silver iodide contained in our modern gelatine emulsion has been often erroneously spoken of I will add herewith a diagram describing the sensitiveness curves of three differently compounded emulsions, but otherwise uniformly manipulated, and taken from previous reports on these, my own experiments.



I. Bromo-iodide of silver gelatine.
II. Bromide of silver gelatine.
III. Bromide of silver gelatine and iodide of silver gelatine.

Curve I., is that of an emulsion containing to 100 parts by weight of KBr., five parts by weight of KI. In preparing this emulsion it is of highest importance to precipitate the two silver haloids simultaneously and in the same gelatine solution. Curve II. corresponds with pure bromide of silver emulsion. Curve III. represents a mixture of emulsion II. and a similarly prepared iodide of silver emulsion, the percentage amount of iodide being equal to that of I.

The temperature when mixing the two emulsions, their actual emulsification, washing, coating of the plate, the exposure of the plates cut into suitable strips and their development were perfectly alike in every particular with the three emulsions. To photograph the spectra a C. A. Steinheil & Sons spectrograph furnished with three light crown glass prisms was employed.

The enormously different results as shown by the cut, and inasmuch as in the bromo-iodide emulsion the two haloids were precipitated at the same time and in the same gelatine solution, entitled it to the foremost rank. It is true the sensitiveness for F is much less than that for G, but it is still much higher than that of any of the other two emulsions, inactive altogether under the light exposed to.

Extending the time of exposure, curve I. rises considerably, while proportionately II. and III. presented but a limited degree in curvature.

Resting upon my successful experiments with bromo-iodide emulsions during the last ten years, I hesitate not to recommend it warmly to all who are interested in the correct reproduction of cyan blue and the adjoining green of the spectrum, but think it necessary to add that for color sensitizing with dye stuffs, with cyanin or erythrosine bromo-iodide emulsions are less adapted than pure bromides, still the bromo-iodide emulsion should not be entirely rejected for these purposes, although highest yellow and red sensitiveness cannot be as well attained with it than with pure bromide of silver.

The behavior of the plate depends much upon the amount of iodide contained in the emulsion. The above mentioned proportions are reliable, and may be well recommended. With more KI blue sensitiveness increases perceptibly, but the plate produced but thin and feeble negatives, which to fix require a very long time.

With less KI blue sensitiveness as well as intensity of the negative are much depressed, but even smallest quantities of KI show a perceptible increase of sensitiveness.

I have referred in the foregoing to natural light sources only. That the bromo-iodide plate is equally well adapted for studio work should be well understood, the best proof for which is given by the results of photographing the hydrogen spectrum in a Geissler tube. The commercial plate in comparison with that of bromo-iodide emulsion will then give a totally mutilated spectrum, there is not the remotest doubt.

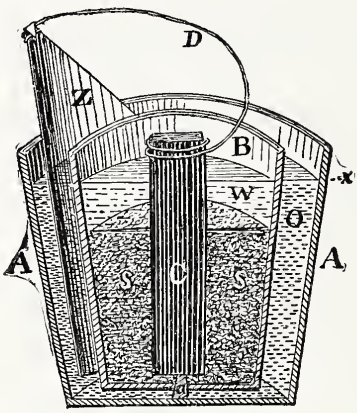
Victor Schumann.

REDUCTION OF SILVER CHLORIDE AND THE ASHES OF WASTE PAPER BY MEANS OF A HOME-MADE GALVANIC BATTERY.

By means of a battery, as shown in the cut, chloride of silver and the ashes from waste silvered paper can be easily and cheaply reduced, and the fine gray powder of metallic silver readily converted into silver nitrate.

The battery is constructed with materials that the photographer can procure in almost any village, excepting, perhaps, the carbon prism.

The outer vessel, A A, consists of a stoneware crock, for a small battery about 6 inches in diameter, and the porous cell, B, is simply an unglazed flower pot, 4½ inches in diameter, preferably the grayish kind, which is nearly free from iron; however, I have used the ordinary red kind with good results. Select one with an even round hole in the bottom, which must be closed with a cork or rubber stopper, *a*. The elements are zinc and carbon. The zinc is a clipping from a sheet which is thrown aside as waste in tinsmith shops, and can be had for a trifle. It may be triangular, as in the cut, or rectangular, bent to conform with the curve of the vessel. The carbon prism, C, may be procured from dealers in electrical appliances, and should be pure carbon. The prisms of the Leclanché battery, containing black oxide of manganese, had better not be used. The carbon from gas retorts, where coal is used, I found to give excellent results. D is a copper wire, one end is fastened to the carbon by several twists at the top, when not furnished with a lug and binding screw, and the other end to the zinc as shown in the cut.



When a sufficient amount of silver chloride has accumulated, it should be freed from foreign salts by the addition of clean water, and after subsidence of the chloride, decanting the supernatant water, repeating the operation five or six times. It is best not to dry the chloride, keeping it under water until ready to be reduced, when, after being washed as above, is

placed in the porous cell B, as shown at S S, adding a few drops of muriatic acid, the carbon prism is then plunged down in the middle of the cell to near the bottom, water added to cover the top of the chloride, as shown at W, and the outside vessel filled with an aqueous solution of sal ammoniac, 1 to 6, up to the line X, and if connections between zinc and carbon have been made the battery is now in action. The apparatus is now set aside for two or three days, or until all the creamy white chloride has been reduced to metallic silver in the form of a grayish powder. The ashes from silvered paper is moistened to a paste, acidified with muriatic acid, and manipulated in the same way, but as the change of the unreduced chloride in the ashes, which also contains metallic silver, cannot be observed, the battery should be left undisturbed for three days. The reduced silver powder is placed in a porcelain dish, washed eight or ten times by subsidence and decantation, and then dissolved with nitric acid, applying a gentle heat. The solution of nitrate will necessarily be contaminated with organic matter, iron, etc., and after being filtered through paper should by means of hydrochloric acid, be reduced again to a chloride, and converted into metallic silver in the battery as before. It is advisable to have a separate porous cell and carbon prism to be kept for this last operation in order to insure pure silver. When this silver is dissolved by nitric acid, and, after proper concentration, allowed to crystallize, it will be found to be pure nitrate. For the method of reducing the waste paper to ashes, and other particulars, see the ANNUAL for 1892, page 126. In converting the moist, gray silver powder to nitrate a gentle heat with a spirit lamp should only be applied, and pure nitric acid poured gradually over it until dissolved. It may be better to leave some little silver undissolved than to add an excess of nitric acid. Should any unreduced chloride remain in the dish, it should be added to the vessel in which you throw down your solution as chloride. The only unpleasant feature in the operation is the evolution of acid fumes in dissolving the silver. It should be conducted in a chimney place or out-of-doors. The nitrate solution is kept over the spirit-lamp until a pellicle begins to form, and is then set aside in a place free from dust to crystallize, or may be brought to the proper strength (specific gravity) by means of a hydrometer.

When paper is reduced to a gray ash by burning, it is very rich in silver. I have lately from $4\frac{1}{4}$ ounces of ashes of silver paper and old filters, procured $4\frac{1}{2}$ ounces of silver nitrate by the galvanic process, as illustrated above. *C. L. Lochman.*

PARAMIDOPHENOL AND ITS DERIVATIVES.

PYROGALLOL (trioxybenzole $C_6H_3 \begin{matrix} OH \\ OH \\ OH \end{matrix}$) and hydrochinon (dioxybenzole $C_6H_4 \begin{matrix} OH \\ OH \end{matrix}$) have been till 1888 the only organic substances extensively employed as photographic developers. Since then quite a series of other organic combinations have been accepted in photographic practice for the same purposes, substances of which it was said to have the same advantages, but not the disadvantages offered by pyrogallol.

A mere glance upon the chemical constitution of these new developers shows them in toto, and particularly so to contain fundamentally an amido group and a hydroxyl group

Eikonogen $C_{10}H_5 \begin{matrix} OH \\ NH_2 \\ SO_2, ONa \end{matrix}$

Paramidophenol $C_6H_4 \begin{matrix} OH \\ NH_2 \end{matrix}$

Metol $C_6H_4 \begin{matrix} OH \\ NH \\ CH_3 \end{matrix}$

Amidol $C_6H_3 \begin{matrix} OH \\ NH_2 \\ NH_2 \end{matrix}$

We furthermore notice that, depending upon the different positions in which said groups of benzole or naphthaline nucleus are related to each other, those permitting direct transformation by oxydation and to bodies of hydrochinon character, are decidedly the most advantageous.

Systematic experiments have proved to me how substances answering to these requirements are pre-eminently well adapted to develop the latent photographic image.

Paramidophenol is probably the best representation of these developers, and I have undertaken for this reason to characterize it in the following lines:

1. Paramidophenol furnishes the first example of organic combination to act upon bromide of silver emulsion as a reducing agent without the aid of alkali. Its primary predisposition to develop admits of no doubt. Solutions of the free base in the proportion of 1 in 200 develop slowly, it is true, but the development of the latent image is nevertheless a fact, and in this respect paramidophenol differs from and excels pyrogallol and hydrochinon, neither of which show

developing properties when the feebly reacting neutral sodium sulphite is present.

To enforce the developing power of paramidophenol so far as to produce practically good results, the addition of weak alkaline solution is a necessity, the neutral sulphite of sodium, for example, being sufficient for the purpose.

A solution of

Paramidophenol (free base)	1 part
Cryst. sodium sulphite	10 parts
Water	200 parts

develops instantaneous exposures within about fifteen minutes, with all tone gradation and middle tints.

2. Paramidophenol forms two series of salts, those with acids, as paramidophenol hydrochlorate $C_6H_4 \begin{matrix} NH_2\ HCl \\ OH \end{matrix}$, and with alkalies, like sodium paramidophenol $C_6H_4 \begin{matrix} NH_2 \\ ONa \end{matrix}$. The first category of these combinations is distinguished by its property to crystallize, and its commercial form is the paramidophenol hydrochlorate. These salts are permanent in air and are generally easily soluble in water.

When sulphite or carbonate alkalies are added to the solutions of these salts, the free base is liberated, which to keep dissolved requires 200 parts of water. Hence it is the acting medium in all paramidophenol developers prepared with a sulphite or carbonate. Phenotates produced from paramidophenol by treating them with caustic alkali have not yet been made in pure form on account of their great tendency to decompose. With sodium sulphite, highly concentrated solutions, as for example, the "rodinal," are possible. They are of enormous developing power.

Salinous combinations like sodium paramidophenol are developers *per se*, and do not require caustic or carbonate alkalies to become active.

3. When the hydrogen of the hydroxyl group of paramido is substituted by carbureted hydrogen, developing property ceases. Paramidophenetol $C_6H_4 \begin{matrix} NH_2 \\ OC_2Hs \end{matrix}$ is not a developer.

4. Hydrogen in the amido group substituted presents two distinguished forms.

a. If but one atom of hydrogen is substituted developing power of the mother substance is retained, or modified according to the character of the substitute.

b. With both hydrogen atoms substituted, the force of the mother substance is very considerably reduced. Dimethyl-paramidophenol $C_6H_4 \begin{matrix} NCH_3 \\ CH_3 \\ OH \end{matrix}$ is not an energetic developer not even when caustic alkali is present.

5. Substitution of the nucleus hydrogen atoms influences the developing power of paramidophenol. With the entering of negative groups, as for example, the sulfo group SO_2OH, or the carboxyl group C.OOH, etc., the use of caustic alkali is necessary to perfect the developing power.

Amido and hydroxyl groups entering have contrary effects. Paramidophenol is a developer *per se*, and its force is increased with the presence of weak alkaline salts like neutral sodium sulphite, but still more heightened when amido or hydroxyl groups enter. Some derivatives of this kind are energetic reducing agents when caustic, carbonate or neutral sulphites are added, one of the conditions for that result being a perfect state of neutrality of the solution in accordance with the constitution of the developing substance. The more amido or hydroxyl group have entered the paramidophenol molecule, the weaker should be the alkali in the solution. A well-working solution of amido-paramidophenol (amidol) is of weak sulphite alkaline reaction, that of diamido-paramidophenol (triamidophenol) is slightly acid.

With amido-paramidophenol (amidol) $C_6H_3 \begin{matrix} OH \\ NH_2 \\ NH_2 \end{matrix}$ carbonates or caustic alkalies, only when in very small quantities, must be objected to, in stronger solution they cause fog over the whole plate.

Solutions of amidol must be made with neutral sulphites for the following reasons:

1. To neutralize the acid combined with the amido-paramidophenol (hydrochloric or sulphuric).

2. To prevent the free base now formed to oxydize in atmospheric air.

3. To furnish sufficient alkalinity to make the solution an energetic developer.

If we inquire now in what respect these new developers, characterized by the presence of amido and hydroxyl groups, are more advantageous than their old rivals pyrogallol and hydrochinon it is noticed—

1. Negatives developed with these new agents show better

tone gradations than those treated by the old methods, their shadow portions have decidedly better details, without excessive intensity of the higher lights, facts explicit enough to show why our foremost professionals are so much in favor of the new agents.

2. The new developers work clearer without exception than either pyrogallol or hydrochinon. The addition of potassium bromide to prevent fogging of the plate is not at all necessary.

3. Yellow stain frequently seen with pyrogallol or hydrochinon developed plates does not occur.

4. The energy of the new developers is promoted by the akalinity of the neutral sodium sulphite. Diamido-phenol (amidol) with this salt only answers all demands for rapidity and force. The absence of potassa or soda absolutely necessary with pyrogallol or hydrochinon does away with evils resulting from excessively strong alkaline solutions.

5. The new developing agents are perfectly harmless. Pyrogallol is counted among the stronger poisons.

6. Their durability when in solution is much greater than that of pyro or hydrochinon in the same condition, hence it is possible to use the same solution repeatedly.

7. Pyrogallol and hydrochinon are not well adapted for the development of bromide of silver paper. The new agents are so. There is a great advantage to the practitioner to use one and the same developer in both the positive and negative processes.

Dr. M. Andresen.

HARDENING GELATINE NEGATIVES.

The negative is developed, fixed, and washed in the usual manner, and is then ready for treatment with my hardening solution, which is composed as follows:

Chloride of aluminium	5 to 12 grains
Water	1 ounce

The stronger the aluminium solution, the greater the amount of heat the negative can stand without softening.

The plate is immersed in the solution and allowed to remain therein for a short time. After immersion the negative can be dried in the sun-light or by artificial heat, without danger of deterioration.

The chloride of aluminium converts the gelatine into a leather which is very tough, and resists perfectly the effects of the most powerful heat.

John R. Clemons.

GELATINE PRINTING-OUT PAPER.

GELATINE printing-out paper is no longer an experiment. It is a step in advance and superior to any and all glossy papers.

Yet in this case, as ever before, the phenomenal conservatism of photographers is in the way to give this paper the quick welcome it so much deserves.

Even its advantages from a financial standpoint, resulting from the rapidity of its working possibilities, have as yet failed to make the use of this beautiful paper universal.

No better printing-out glossy paper is made anywhere than here in the United States, and even a feeling of patriotism should push this paper into general use here, for *it* alone can make us independent of Europe for a supply, which we are not, as long as we depend on albumen paper; for, when all is said, America has never yet been able to compete with Germany in the manufacture of albumen paper, and millions of dollars thus flowed into Europe's pocket, a mint of wealth, which now, that we have a substitute in gelatine paper of superior quality, ought to remain in the country.

Our gelatine paper is as good as the best. Europe can do no better, and if it were not for this conservativeness of the photographic brain, albumen paper would long ago have fared worse than the Chinese.

When the gelatino-chloride printing-out paper was first put upon the market in this country, everybody admired the beautiful results. Specimens, sent out by the manufacturers, made by Sarony (the specimens, I mean), had but to be seen to be praised. Since then, time has proven them to be at least as permanent as albumen prints, the cost certainly no higher, the keeping qualities, both before printing and between printing and toning, far ahead of albumen paper, and so nothing was in the way to hinder the general adoption of the paper, except its being a new thing, the use of new formulas for which had to be learned, and the fear of failure prevented the revolution as yet. But a good thing cannot be praised too often. Those who have adopted it for their regular work should more frequently give their experience. Writing it up will never injure its reputation, for it is all that has ever been claimed for it.

In a former article on the same subject, as it is a paper I almost invariably use, I gave my method of toning and fixing in winter. During the heated season some precautions are necessary, not called for during cold weather:

The baths, when toning and fixing separately, should, in summer be kept cold with ice. When using the combined toning and fixing bath, the ice may be dispensed with, the formula as given by the manufacturers, hardening the prints at once sufficiently. By substituting Helmold's hardener for the usual hypo-solution, either in combined or separate baths, the prints become so toughened, that all danger from heat is overcome.

Care should be taken, when using the combined bath, to keep up the relative proportions between gold and fixer, so that the pictures are both toned and fixed about the same time.

A. Helmold.

PHOTOGRAPHS OF THE WINDOW SIDE OF ROOMS.

A ROOM never has a more pleasant aspect than when the sun, slanting through a window, throws a beam of light across the floor and brightens up all the objects in its path; and the cosiest and most attractive part of a room is generally the window corner.

As, however, the photographing of subjects of this sort has been tabooed by all the authorities, few amateurs attempt them, and they generally wish they had taken the authorities advice not to let a plate get a glimpse of sun-light when exposing for an interior.

Still, the 600 rode to glory by spurring full tilt into the face of all the big guns that presented themselves, and there were probably fewer at Balaklava than the number of cannons that can be found in an incomplete series of the TIMES ANNUALS; and a picture may be readily made, on any plate, that shall show to its full effect the sunbeam on the floor, and the cosey window corner with its outside view, while at the same time representing all the objects inside of the room, and that, too, without any loss of detail—either at the windows or in the shadows.

The easiest way to accomplish this is to expose, on all the windows and sunshine it may be desired to reproduce, for one-fifth of the time that would be given to an open view in the same sunlight out of doors, afterwards capping the lens until dark, and then filling up the plate by flash light.

The story of the illustration will guide the most inexperienced:

Plate: Eagle Orthochromatic.

Stop: $f/48$.

Exposure: $\frac{1}{25}$ second for the sun. 1 second for the flash light.

Development: 35^{M}, with 3 grains of eikonogen per ounce.

For a room 20 feet square, four of the Scovill & Adams No. 3 cartridges can be arranged in a semi-circle, an inch apart, on a tray, in front of a reflector *bowed inwards.* If four strips of newspaper, 1, 2, 3 and 4 inches long, gummed to the tray to prevent the first explosion from blowing them away, be lit at the same moment, the four successive flashes give a cumulative and better effect than if set off all together.

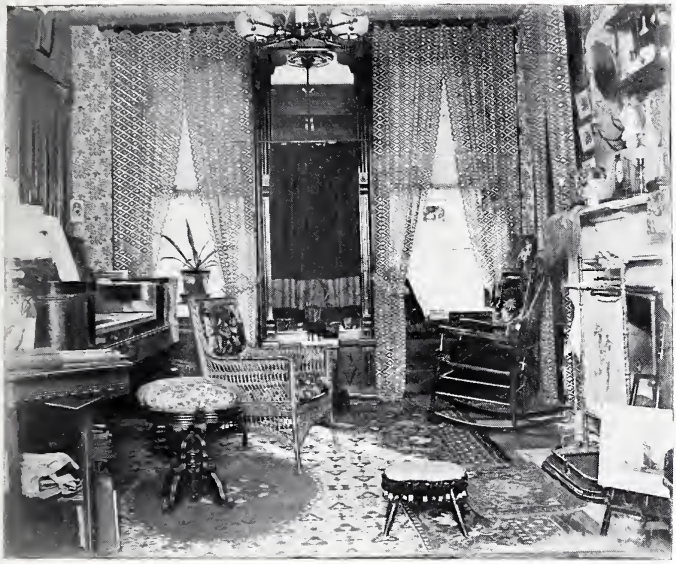
The negative so made will "print itself," requiring no masking, reducing or intensifying, and any one who compares the illustration with the pictures on pages 143 and 144 of last year's ANNUAL, or with any of the show pictures of the non-halation plate makers, will see at a glance the merit of the foregoing method.

James Reüel Smith.

A GOOD USE FOR THE CAMERA.

WE were looking for a view of the mountain and suddenly through a side-path opening from the road we came upon a little shanty, unfinished, and partly covered with tarred paper, an old chair and piece of carpet were near the open door, fish nets spread on the fence and broken clam shells on the ground. We asked a little ragged boy who appeared on the scene, "Where is the baby?" "Down at the brook." "Please bring her here," and soon the little yellow-haired, two-year-old girl came along, holding the hands of two older brothers and smiling up at them with perfect confidence. The father was away fishing, that was his business; the mother was out working by the day, and the boys were taking very good care of the little one. We carried away in the camera a picture of the group sitting near the open door with the woods beyond. We said to the older boy, "Look at the baby's hand as if you thought a splinter was in it," and so he examined it carefully, and the picture was taken.

When we brought a blue print for inspection some days later the mother was there and was delighted. "Don't you sometimes have one for the parents?" "Certainly, keep this," we said, but in due time had a silver print made and framed with



J. R. Smith, Photo.

"PHOTOGRAPHING THE WINDOW SIDES OF ROOM."

(See article on this subject.)

Miss S. J. Eddy, Photo.

A GOOD USE FOR THE CAMERA.

(See article on this subject.)

a simple moulding, so that the picture of the children could be kept for years.

The father, too, was there, and was greatly pleased. "I wouldn't take nothing for that," he declared.

Another time driving in the country we came to a farm-house, and on the door-step sat a brown-eyed mother holding a bright looking baby, a little curly-haired girl leaned against her, and a serious-minded dog, black, with white patch in front, stood near by. There was a picture, and after a few necessary preliminaries it was taken, developed, printed, and presented to the happy parents one evening when the father had just come home from work.

Another picture that gave great pleasure was that of an old man feeding his ducks. We could hear shouts of delight after he had carried it into the house to show to his "women-folks." They had "never had a picture of father—never could get him to sit for one," they said, and couldn't I let them have a dozen?

On a street in one of the poorest parts of the city a little curly-haired girl was digging dirt in the stump of an old tree. Beside her was a still smaller child with a shawl pinned about her head. There was a picture! So we stopped the carriage and looked at it, until a rather forlorn-looking woman came out. They were her children, and when we said we would like to take their pictures, she brightened up and told us she had been calculating to have one taken but "he" was loafing, and she couldn't afford it, and there was a dress to be got, etc. We suggested that we would rather take them just as they were. That picture is not taken yet, but we are planning for it, and very likely will make one in the starched dress to please the mother, as well as one in the ragged shawl to please ourselves.

These are but a few instances of the way in which we have given great pleasure by means of the camera, as well as carried away satisfactory pictures. But there is still another element in this manner of picture taking; we enter into sympathetic relations with the people who furnish us the pictures. We are grateful to them and they are *very* grateful to us. We meet on common ground. In no other way, perhaps, could we so quickly enter into their confidence, and if we wish to help them in any way it is far easier to do so than if we introduced ourselves in any other fashion.

Sarah J. Eddy.

THE BATTLE OF THE PAPERS.

If albumen paper is not soon driven from the field it will not be because its rivals are not sufficiently numerous or sufficiently formidable. Neither will it be because it has not been and does not still continue to be the subject of enough abuse, just or unjust. It has survived this, and all the competition which has been brought forward to supplant it for nearly forty years. Now a new array of more or less imposing names appears on the list of contestants for its honors and emoluments; and they have come to stay, so we are informed on the best authority, to wit, that of the first person singular, each one in turn claming that priority. When the list of names will be completed it promises to be interesting. It may require an index for easy reference.

At some studios one is told that this, or that, or some other paper is the style, and the old fashioned kind, so long in common use is held in the background, and even, as I am told, sometimes made to appear disreputable by being offered at half price. Well, these lofty airs will need to be backed up with good keeping qualities or the same old-fashioned paper will live to do good service after most of these others are forgotten.

It is claimed that photographers generally do not care to have their work last too long, having the notion that the sooner it fades the sooner more of the same kind will be wanted. Whether this charge is true or not, they may be in a fairer way than they know of, to realize in due time, the benefits to accrue from the fading of their work. Let the silver in the paper, or rather in the thin coating of the paper, be reduced to the lowest possible quantity that will produce a brilliant print, and this lowest quantity is next to nothing a sheet; then contrive a combined toning and fixing bath with restrainers, and modifiers, and toning agents, whose united actions and reactions will, no matter how, bring the proofs to a satisfactory color without annihilating them, as a simple vigorous toning bath of gold would do, and you will have the appliances for furnishing your patrons with work that will need doing over quite as soon as they will care to have it; possibly they may be tempted to visit a more reliable establishment, if such an one is not too far away.

Undoubtedly the extreme tenuity of the silver stratum on which opal prints were made when these were in vogue, was the fact which explains their want of permanency and the remarkable brevity of their popularity; a notable example of

the value of a process in photography wherein the stimulus of instability is resorted to as an element of prosperity.

A great advantage which the new papers have over the albumen is, if what is claimed is true, that they require so much less washing. So great is the facility with which they may be gotten through the stages intervening between the printing frame and the delivery counter, that a day's printing may be toned, fixed, washed and mounted in an hour. The question is, how is the hypo, alum, lead, more lead, etc., etc., to be eliminated from the paper in the half-hour allowed for the washing? My answer is that the hypo and other ingredients of the bath are not nearly enough eliminated in any such time. Is it to be supposed that paper coated with collodion or gelatine will yield up those salts appreciably sooner than the same quality of paper if coated with albumen? It is chiefly the body of the paper that retains the hypo, and which is much too often allowed to remain there in sufficient quantity sooner or later to effect the ruin of the print, and I know, from having tested the water in all stages of the washings, not only occasionally, but continually for twenty years, just how difficult it is to get the hypo out of paper when one side is covered with a practically impervious coating. Osmotic action is out of the question with albumen paper. This I have tested and proved conclusively. I take it that the same is true of collodion, but have not made a direct test. Whether gelatino-chloride paper will give up its hypo more readily than the albumen I will not pretend to say. It would be folly to presume that either of these last would do so, without proof. Until this is furnished it would be safe to presume that the different papers require equal washing to get rid of equal quantities of hypo. I consider a reliable hypo test always indispensable in making silver prints.

It is a fact not to be denied that the thorough washing of prints does not receive half the attention which its importance demands. I have handled thousands of unmounted specimens from all lands, many of them showing the highest skill in the production of both negatives and proofs; charming views full of light, of details, of atmosphere, brilliant, soft, picturesque,—in short such as the photographic art has not yet been able to surpass under the skill and taste of any one, living or dead. What, do you imagine, have I found in these prints? It might reasonably be expected that the intelligence and skill shown in every visible detail would suffice to carry the work to a faultless completion. Not so. On the contrary, the

quantity of hypo which I have often found in them is enough to prove a culpable neglect of precautions which every photographer ought to thoroughly understand.

When these photographs come to hand they are mostly bright and fresh, such as tourists would most naturally select in making their collections. But in nearly every lot a few are found which have lost their freshness and unmistakably betray the bad effects of the remains of the fixing bath. Some in a collection not yet delivered have arrived at the yellow-green stage and yet the subjects are nearly intact. These prints being on albumen paper were rich in silver and gold. What would probably have been their present condition had the silver been next to nothing, gold unknown, hypo maximum, or what is left after thirty minutes' gentle washing?

Right along here my friends, lies the line of battle in the paper war. I expect that when the smoke finally clears away, the winner of the day will be found to be the one which carried the most silver and gold into the fight. But, dropping the simile, may not this be the beginning of the end of the ascendency of silver printing? Is there not some danger that this rivalry will result in its general demoralization and finally in the demand, in all high class work, for something the permanency of which will not depend upon any caprice of chance?

W. H. Sherman.

PRESERVING THE INSTRUMENTS AND FURNITURE.

It is all very well to buy new instruments and new furniture when one is flush, but it pays far better to keep what we already have looking like new.

The camera, camera stand, frames of polished wood, oak, walnut, or in fact anything but gilt will be kept as good as new by rubbing them occasionally with a solution of three parts linseed oil and one part turpentine. Apply with a woolen cloth and rub with a dry woolen cloth until dry. All brass tubes or nickel work can be cleaned by rubbing them with a solution of whiting and ammonia, applied with a woolen cloth as before directed. And should one be so unfortunate as to spill coal oil on the carpet, or have a grease spot already formed from a leaky lamp, it can be easily removed with a sponge wet with chloroform. This is a little expensive but it beats buying a new carpet.

Some elbow grease must be mixed with each ingredient.

J. R. Swain.

ANIMAL MOTION IN ART.

(A Plea for the Orthodox.)

Yes, a plea for the orthodox, and by orthodox I mean the attitudes that were universally accepted just prior to the discovery of the possibilities of "instantaneous" photography, whose marvelous revelations have completely revolutionized the portrayal of animal motion in art, so that a school has arisen whose sole object seems to be the production of bizarre effects in the complicated entanglement of the limbs of their horses, dogs or men.

Understand, please, that I am not questioning the value of the camera to the artist; my having permanently discarded a feeble and inadequate brush for the more capable lens, should absolve me of that charge. Photography is of incalculable benefit to the genre painter or draughtsman, but, like everything else, it should not be carried to extremes.

And I do maintain that the modern method of illustrating animate motion, based entirely on rapid exposures, is incorrect. It is snappy and gives "action," and, to a certain extent, may be "ter-ruth," as Mr. Chadband would say, but it is not art, or the truth of art. The object of art is to reproduce what we see, and what we see of a running horse, for instance, is best depicted by the old orthodox manner of drawing him (well exemplified by Wagner's celebrated picture of a Roman chariot race), and not by the faithful copy of a race-finish negative. The eye, less rapid than a "lightning" shutter, blends innumerable disjointed impressions into one harmonious and definite whole, and the brain accepts this as its conception of the speeding horse; and surely, we need not go behind the combined returns of retina and cerebellum, for they deliver the verdict of nature, and art is founded beyond all on nature.

A picture, moreover, should please, if possible, as well as relate cold facts. The horses in Wagner's masterpiece referred to above, are "things of beauty," which is certainly more than can be said for the angular and spasmodic productions of many well-known magazine illustrators, the limbs of whose animals appear to be indulging in "demi-semiquivers," as an old darkey acquaintance once remarked.

The testimony of shutter and sensitive plate establish beyond cavil the fact that at a certain period of his career a running horse assumes such or such an *outré* attitude, but if, in our search after truth, we draw him so, we adopt the exactness

of a fraction of a second as our record for all time. In the next one-thousanth part of a second he will take a totally different posture, and so on and on. If I may be allowed to tread on such delicate and august ground by way of illustration, I would ask: Does a portrait painter when called upon, in the interests of history and posterity, to limn the features of Victoria Regina, portray her just awakened from sleep, with dishevelled hair, indulging in an unromantic, commonplace, democratic yawn? Why, its almost misprision of treason to even suggest it, yet there can be no doubt but that "at a certain period of her career" such would be a faithful likeness of that highly esteemed and sovereign lady.

No, give us truth, but first let us be sure what, in its highest sense, constitutes truth. She is said to dwell in the bottom of a well, and is seen so seldom in this world of delusions that it will not do to rashly lay down rule-of-thumb precepts for establishing the linements and attributes of the goddess.

As I stated at the outset, this argument in no wise militates against photography; that science has too broad and important a future before it to be dependent for popularity upon a slavish following of its revelations.

Nor should it in any way detract from the reliance of the true artist upon his camera. While he will do well to refrain from emphasizing the striking peculiarities it presents, he will invariably obtain more vigor and life and "go" in his pictures if the original suggestions be derived from the lens and drop shutter. By their constant use he will add to his knowledge of anatomy, and his ability to draw it, under varying circumstances, even though in his finished work he modifies and "adapts" the unnatural outlines that the negative displays. The camera may be looked upon simply as a means of inspiration to the artist, and to the master workman inspiration is all that is needed; suitable tools, in his skilled hands, will do the rest.

To sum up. Let us strive to draw animated nature both truthfully and artistically; not after the manner of the Old Masters, for they couldn't even draw a conclusion, else they would have realized what wretched work they were foisting on posterity; nor yet in the style that at present very generally obtains and is daily becoming more and more popular; but rather as it was depicted, previous to the introduction of the "instantaneous" shutter, by such modern princes of the pencil as Meissonier, DeNeuville, Detaille or Wagner.

Val. Starnes.

THE PHOTOGRAPHIC BUSINESS OF TO-DAY.

They were golden times when in the early hours of a working day a lot of glass plates were carefully cleaned and polished, made ready for the large throng of customers to come, waiting to be prepared with collodion and to be sensitized in the nitrate of silver bath to photograph upon them the human face and form.

It is true, with the wet plate of our halcyon days, many things could not be done which now are easily accomplished with the dry, but then the demands made upon the photographer were not as great as they are now, and much better prices were willingly paid for the work done. I do not mean to say that with the advent of dry plates the demand for more artistic pictures has been better answered, or that a man in possession of skill and talent is better able to make artistic pictures with them, but it is well understood the dry plate has introduced to the professional photographer a multitude of purely business disadvantages.

These men or many of them have been accused of not being progressive, but having remained upon the same artistic or rather non-artistic point upon which they stood ten or fifteen years ago; to have neglected to elevate themselves above ordinary every-day work, not to have tried to improve the taste of the public or to lead it more toward the truly artistic, and not to have utilized the many advantages offered by the dry processes.

That may all be true and correct in a measure to some extent, but it should always be remembered professional photographers work for money, and for that reason is he compelled to listen and submit to the wishes of his patrons, no matter what they may be, and make pictures as demanded. As far as that goes, the amateur is entirely independent; he photographs for pleasure's sake, not for profit; there is no one to direct him; he has abundant time to work. He is the only one to pronounce upon the quality of work and delivers his pictures even if they are wanting in several directions, and that his pictures are very often better in the artistic than in technique cannot be wondered at. The amateurs' pictures are not to be paid for, and that they are generally quite satisfactory is the consequence of costing nothing, besides that the picture has been made by a member of the family, a relation or friend who presents it as a specimen of his skill, and a proof of his genius.

Of all these things I did not intend to speak when I began, but thought of considering our present business affairs as such. In all and every one of the photographic journals, may they come from America, England or Germany, we read of continued depression in business, and here and there remedies proposed to cure the evil. If we inquire into the causes why our business is going down so very much, we find, besides the enormous increase in the number of amateurs, three main causes having wrought the effect.

First, the abundance of pictures made has been followed by indifference toward them, and no particular desire to have any is now manifested; secondly, the enormous and ever growing opposition in trade, and, thirdly, the injudicious reduction of their prices.

The public have been supplied with photographs *ad nauseum*. Nowadays there is scarcely space to be found on the walls of our parlors, libraries or sitting rooms to hang up a picture of larger dimension; our albums are filled, and on our centre tables abound photographs of family members, relatives, celebrities in head and bust, three-quarter and full figures in all possible and impossible attitudes, and all the popular dimensions. The desire to have more or new pictures has been reduced to a minimum.

But I do not wish to exaggerate. Photographs will be wanted and be made in all times to come, although the demand for them is indeed at present very small, but it is in proportion to the ever increasing opposition. That our business is very unmistakably less than what it has been ten or fifteen years ago cannot be wondered at.

The reducing of prices introduced by the opposition approaches lunacy. With the present rates, the professional does scarcely earn as much as expenses amount to. Rent, salary, cost of material swallow up nearly all. Nevertheless everybody shows a tendency to reduce prices still further, only for the purpose to make a little capital for himself.

The present method of calling attention to certain ateliers by boastful advertisements is in every way objectionable. Proprietors, who, by means of knowledge, skill and experience, thought to be too proud to resort to such means, lower themselves in the estimation of the public and their colleagues. It is the same with the advertising of their "commodious, elegantly and gorgeously furnished rooms."

There are others again, not at all comparable with them, neither in skill or knowledge, a lowered class resorting to

legitimate as well as illegitimate means to increase their revenue.

In consequence of all this the public is rather justified in demanding comfort and elegance of atelier and adjacent rooms, faultless pictures artistically, technically and finished elegantly, and all this for still lower compensation. If that continues, we will soon arrive at a point when the proprietor of an atelier will not be able to pay current expenses, not to speak of saving a dollar for a rainy day.

My readers, although belonging to professional circles, will say all this is very true and correct, but give us the means to raise us up again to the former and prosperous condition.

Fully aware of the existence and of the growing of the evil nothing serious has as yet been done to remedy it.

A radical remedy can consist, in my opinion, only of an appeal to the public and a strong union of the better elements of the profession. For direct means and ways our societies should be resorted to. Success is possible only through their exertions and those of individuals. Nevertheless, all proprietors should make efforts of reformation, at least within their own precincts.

Friedrich Müller.

WHAT SIZE PLATE SHALL I WORK?

Upon the selection of a suitable size of plate depends much of the comfort of the photographer; while the amount of work done will be found to bear a very direct relation to it.

I began photographing with 5 x 4 plates, and I strongly recommend that size to the beginner, in preference to the "quarter-plate" usually recommended to those who are just entering on the study of "the black art."

Commencing with a small size, it is not unusual to find the successful worker anxious shortly to pass to one very much larger. In fact the jump from the quarter-plate ($3\frac{1}{4}$ inches by $4\frac{1}{4}$) to a 15 x 12 plate is not unfrequently made; while the 10 x 8, and the 12 x 10 are also much patronized sizes. In my own case, my second camera was a "whole plate" ($8\frac{1}{2}$ x $6\frac{1}{2}$) and I advise no one to exceed this size for general out-of-door work. But experience has proved to me that even the whole plate is somewhat too heavy and too bulky for general out-of-door use, and especially for tourist work. The size which I am now working is 7 x 5; and I find this in every way satisfactory. The resulting prints are large enough to look like "pictures,"

and they are not too large to be enlarged. For the diagonal of a 7 x 5 plate is only $8\frac{1}{2}$ inches, and therefore a condenser of their size will include the whole of the subject.

I should advise any one beginning photography to purchase his kit for this size at once (he could not do better than get the "Henry Clay" camera, which is now my constant companion, and which I described in last year's ANNUAL), for he will thereby be saved the not inconsiderable monetary loss involved in disposing of the smaller camera with which beginners usually start.

In England the 7 x 5 plate is rather an exceptional size, and has usually to be specially ordered from the makers. But is this a disadvantage? Certainly not. You probably get better plates, and you are certain of having fresh ones. The "half-plate ($6\frac{1}{2}$ x $4\frac{3}{4}$) is a size very much favored in England; and the $7\frac{1}{2}$ x 5 is another size used by certain well-known English amateurs; but I consider that the proportions of the 7 x 5 are better than either of these.

In connection with this subject of plates, I should like to call the attention of both users and makers to the loss of surface at the margins of plates. This seems to be never less than the eighth of an inch all round, and is often considerably more. Would it not be possible to devise some method of holding the plate or film by which the whole of the sensitive surface might be used? The loss is most serious, of course in the smallest size, and is another reason for avoiding the "quarter-plate."

W. Jerome Harrison, F.G.S.

NOTES ON ARCHITECTURAL PHOTOGRAPHY.

IN the article under this heading in the 1893 ANNUAL, mention was made of the desirability of exercising great care in the choice of a position for the camera when photographing architecture.

Just as in exterior work, we never (unless the photograph is required for scientific purposes) place the camera exactly opposite the centre of a facade; it is inadvisable to place it in a line which would bisect the angle formed by the two street fronts of a corner building, for if we do this, the result, though giving us symmetry and balance of a kind, does not give the particular description of balance that pleases the eye, and the photograph has the appearance of monotony. The converse of this holds good with regard to interior work, the most pleasing results

being seldom obtained from such a position as will lead to the production of an image, both sides of which will be identical as regards their leading features. In photographing a hall or the nave of a church for instance, a more satisfactory picture will be obtained if the camera is placed on the right or left of the centre line.

The necessity for retaining the focusing screen in an absolutely vertical position if straight lines are expected in the negative, also of backing the plates or using very thickly coated plates if halation is to be prevented, will hardly need more than mentioning, as the observance of these two points is insisted upon by all men of experience.

Wide-angle lenses should be used with caution, though for interior work they will very often be required, unless the room admits of being photographed through a door, window or other opening. This does not apply to long, narrow rooms and galleries, which can generally be well rendered by a lens giving only a moderate angle.

In focusing and arranging the subject, in the case of a dimly-lighted interior, candles are of great use, as they may be moved from one spot to another by an assistant, and in this manner the amount of subject included by the lens can be ascertained with ease, at the same time the flame offers a good subject for focusing upon.

In developing work which shows great contrasts, such as most interior work, it is advisable to use less than the normal quantity of pyro, and in many cases to reduce the bromide also, otherwise the image may be chalky or spotty, unless a very full exposure has been given. If one is certain of the exposure, a moderately quick development appears to be less productive of halation than where development is protracted, though slow development gives an opportunity of applying accellerators or restrainers locally.

When photographing buildings which are on a much larger scale than usual it is well to arrange for a few figures to occupy a portion of the field, as they serve to give scale to the structure, and to enable people who have never seen the building to form some idea of its proportions.

Other details might be touched upon, but most of these will suggest themselves to the operator in the course of his practice, and as space is valuable, many remarks have been excised at the last moment to save the editor the trouble of curtailing this article.

It may not be out of place here to call attention to a printer's error in the article by the writer in 1893 ANNUAL.

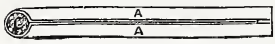
There, an *ingenious trick* which had been adopted by a photographer in order to obtain a peculiar effect was mentioned, but the printer upset the whole sense by calling it an *ingenious brick*, and doubtless many who may have taken the trouble to read the article failed to understand what was meant by the writer of it.

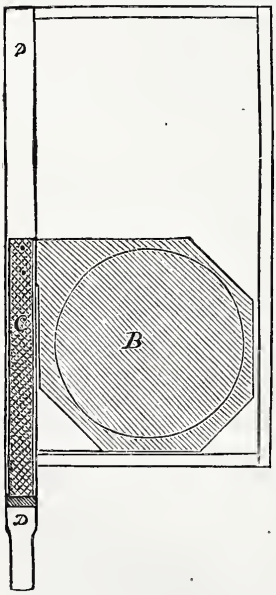
J. H. Harvey.

A SIMPLE AND EFFECTIVE PNEUMATIC SHUTTER.

The shutter about to be described is not new,—the one I use was made many years ago. But many photographers who have lately seen it express themselves highly pleased, and think it worthy of note as it is the most simple and effective they have seen.

Cross Section at FF.





It is contained in a light wooden case fitted on the front of the lens mount in the usual way.

In the sketch, A is the case, the front, back, top, bottom and one side are wood; the other side is formed of a piece of drawn brass tube D, about one-quarter inch in diameter, and a little longer than the case. In this tube, fitting very freely, is a cylinder of wood (C) to which the vane (B) of the shutter is attached (this is done by making a fine saw slit across its diameter about one-half inch long into which the tail-piece of the vane is glued and pinned in. The vane is best made of tale covered with thin paper and black-varnished; it should be as light as possible. The brass tube is slit from the top to C to allow the connecting piece of the vane to pass up and down without friction. The circle marked shows the opening of the lens. When thus far made the vane with its wooden piston rod should slide up and down quite freely when the case is turned about. The last thing to be done is having the bottom end of C quite flat

and square. Glue on to it a piece of thick cloth, and when this is set hard, trim off the cloth with a sharp knife so that it will fit the tube just tight enough to stop it from falling down (by its own weight) when in an upright position.

The rubber tube with hand ball is to be attached to the projecting piece of the brass tube, and the shutter will now work up and down as the ball is pressed and released, either quickly or slowly and is completely under control.

Horatio Yeates.

DEVELOPING BRIEF EXPOSURES.

Some experiments in the treatment of very short exposures may be of interest to the readers of The Annual, though they involve nothing new or that may not have been told by other experimenters. As all know who attempt instantaneous work, the worst difficulty in the development of under-exposed plates lies in the fact that they have a desperate tendency to turn out so dense in the lights that all detail in them is lost, while the shadows run to veil. To counteract these tendencies is the study of the experienced operator. The plan which has best succeeded in my experiments is the following, and, as the data will prove, it has a decided value: I gave four plates respectively exposure on running water, in which was a cascade of several feet, the 400th, 600th, 800th and 1000th parts of a second, the time being as indicated by the Thornton-Pickard focal-plane shutter. The subject is an extremely difficult one, which is to me a reason for using it in experiment, it being the famous Fountain of Trevi, to which all superstitious people who wish to return to Rome, go to drink the night before leaving. It has a great deal of statuary in its arrangement, with rock-work, on which grow ferns and mosses, always fresh and of a vivid green, which makes the shadows and deep recesses so refractory to the action of the light, that no rapid exposure will bring them out satisfactorily, while the water in motion, and especially the falling portion, need the shortest exposure possible. I began the development with a weak pyro solution and a large addition of soda, for the longest exposure. The result was an unprintable negative in which the high lights were entirely buried before the shadows were nearly out. The second had a mixed pyro and metol, with soda, and was somewhat better, but still too dense in the lights, to print satisfactorily from. The third was developed with

metol and soda, it being found that the pyro discolored and began to stain the negative under prolonged action, in spite of the presence of a maximum of sulphite of soda, while the action of the metol, though very protracted, left the film unstained, but even in this the density of the lights was relatively too great. The fourth, which had received the least exposure, was then put to soak in a solution of carbonate of soda, about one part of a saturated solution to ten of water. There it remained for some minutes and the soda solution was then poured away and one of metol, of about the strength of one-quarter per cent. and with no soda, was poured on, and when the image showed well, this was diluted by an equal amount of water and put on a shelf covered from the light even of the dark-room and left for ten or fifteen minutes, soda being then added gradually till the shadows began to show signs of veiling. The result was the best of the four trials, although when printed the details of the foaming water where it came into the sunlight, were nearly buried, though with a weakly silvered paper they might have been made effective; but I had no such paper, nor the time to prepare it. And by the way, there is great need for a paper that will work with intense negatives, all the commercial albumenized and sensitized papers being too strongly silvered, it being more difficult to sensitize with a weak bath. The Solio paper, which is that generally used here, and that which gives the best results with a negative of moderate or low strength, is too intense for the negatives which suit albumenized paper best, and is impossible with an intense negative, such as is most likely to result from under-exposure.

The philosophy of my experiment is very simple. I employed metol in the development, not because it was more potent on the latent image, but because it does not stain, and chiefly because it does not favor intensity, which was my worst danger. I wanted a developer which would produce the weakest negative that could be produced, and the non-actinic color of the metol favors this desideratum more than any other developer I know. I wanted a developer which permitted the prolongation of the process to the utmost, without the over-intensity of the high lights, and this I had in metol. It is possible that at another season of the year when the temperature of the dark-room could be kept down below 80 degs. Fahr. pyro might work more satisfactorily and being used in a very weak solution, the operation could be carried on indefinitely, renewing the developer from time to time, but

with the gelatine kept with difficulty from dissolving off the plates (for there is little use of ice with us) it is necessary to hasten the operation somewhat, and this is another reason for the use of metol, which works quicker than pyro. For our ordinary work we do not require ice, as the aqueduct water is about 50 degs. as it runs from the pipes, but when it has to stand in a room long it rises to a melting temperature of gelatine, and it is difficult to handle the plates without taking off a part of the subject. When I get an opportunity to renew the experiments I have described, I shall try at length the effect of the different developers, pyro, metol, etc., and when I can get it, the last, reducing, which comes like all the other new ones, advertised as needing only half to one-third the exposure of pyro.

W. J. Stillman.

THE INFLUENCE OF DEVELOPMENT ON THE CHARACTER OF THE NEGATIVE.

There is no question that has excited more attention amongst English photographers during the past two years than the relation that exists between the time of exposure, the manner of development, and the character of the resulting negative. There is a widespread belief amongst photographers that it is possible, by suitable variations in development, to alter what are commonly called the gradations of the negatives, and thus compensate to some extent for errors in exposure. A belief of this kind is the result of accumulated experience, and is not to be lightly set aside.

The quantitative researches of Abney, and Hurter, and Driffield, have, however, thrown quite a different light upon the problem. Hurter and Driffield state as the result of an extended series of measurements, that the ratios of the densities of the deposits corresponding to different amounts of light action are determined by the amount of light action and the character of the sensitive film, and are not affected by the manner of development. The "density" they define as the quantity of reduced silver per unit area. They further state that the ratios of the densities remains the same throughout the process of development.

In the first place it is important to note that the significance given to the term "density" by Hurter and Driffield is quite different from the sense in which it is generally used by

photographers. When a photographer speaks of the density of a negative, or of parts thereof, he almost invariably means the *opacity*, which is by no means the same thing, although the two are intimately related, and it is to be regretted that the use of the word "density" in an erroneous sense should have become common amongst photographers when the correct word "opacity" was ready to hand. At the same time, there is no doubt that Hurter and Driffield's use of the word density in an unfamiliar sense has prevented their results from being properly understood and appreciated by photographers.

It is very important to observe that Abney, Hurter and Driffield, who are the only people who have made any extended series of quantitative experiments in this direction, are agreed on the chief point that the ratios of the densities are determined by the amount of light action. They differ only as to the precise form of the equation that connects the two quantities.

What photographers are chiefly concerned with is the printing quality of the negative, and this, of course, depends on the ratios of the *opacities* of the different parts. Now it follows at once from the ordinary law of absorption (which Hurter and Driffield regard as holding good for the deposit on a negative) that the ratios of the opacities may vary greatly whilst the ratios of the densities remain constant, provided that the *absolute values* of the densities vary, because whilst the densities increase in arithmetical progression, the opacities increase in geometric progression. This is clearly illustrated by the following table, which represents the same negative in the different stages of development, the ratios of the densities remaining constant whilst their absolute values vary.

Case I.				Case II.			
Thickness of the silver layer.	Ratios of the densities.	Quantities of light transmitted.	Ratios of light trans.	Thickness of the silver layer.	Ratios of the densities.	Quantities of light transmitted.	Ratios of light trans.
1	1	$\frac{1}{2}$	8	2	1	$\frac{1}{4}$	64
2	2	$\frac{1}{4}$	4	4	2	$\frac{1}{16}$	16
3	3	$\frac{1}{8}$	2	6	3	$\frac{1}{64}$	4
4	4	$\frac{1}{16}$	1	8	4	$\frac{1}{256}$	1

It seems clear therefore that although we cannot alter the ratios of the densities, we can alter the absolute values of the densities by stopping development at different stages, and thus we alter the ratios of the opacities and consequently the printing qualities of the negative.

It would seem that sufficient attention has not been given to the effect of general fog on the character of the negative. By "general fog" is meant a deposit of silver produced all over the negative by the action of the developer alone without reference to the action of light. It is noteworthy that all the modifications that are made in the developer with a view to compensate for under-exposure, namely, increase in the proportion of alkali, reduction in the proportion of bromide, are modifications that tend to increase the amount of fog. Reduction in the proportion of pyrogallol has the same tendency because it necessitates prolongation of the development. On the other hand the modifications that are supposed to compensate for over-exposure, namely, increase in the proportion of bromide and reduction in the proportion of alkali, are modifications that tend to reduce the amount of fog. It is probable that the influence of general fogging is to a large extent indirect and secondary. Whilst the negative remains free from fog there is a tendency to continue development, thus increasing the absolute value of the densities and increasing the ratios of the opacities, as in Case II. in the table. As soon, however, as much general fog makes its appearance, there is a strong inclination to stop development, and if the fog appears early development is stopped whilst the absolute values of densities are low and, consequently, the ratios of the opacities are low too, as in Case I. in the table.

The presence of uniform general fog alters the ratios of the densities, but does not alter the ratios of the opacities. It does, however, alter the absolute values of the opacities and in this way alters the relative printing qualities of the negative, because as the light transmitted by the various parts alters in arithmetical progression, the degree of blackness of the print alters approximately, at any rate, in geometrical progression. In other words, if you have two negatives each bearing precisely the same densities as the result of light action and development, but one has a layer of general fog whilst the other is free from fog, and if you print with these negatives side by side, in light of the same intensity, the two prints will be distinctly different in appearance.

C. H. Bothamley.

EXPRESSION IN PHOTOGRAPHY.

It has been a matter of comment and criticism in England as well as here that our photographic exhibitions contain so little of artistic worth. Technical excellence is conceded, but the absence of all else is deplored. It cannot be denied there is a growing sense of composition shown at each succeeding exhibition, but the sense of *color* seems to drag. It may be stated as a curious corollary to this that the painter with all his training in color does not produce the best photographs in his early work when he takes up photography, and that the amateur without any training in color may surpass him until the painter learns to translate color into black and white. The painter may have the advantage in training in composition, but as the amateur progresses in his studies in the expression of color in black and white, he will equally progress in composition. It is neglect of the study of the translation of nature's coloring into monotone that ruins composition and gives occasion for the wail of the critics at our exhibitions.

The amateur with the hand-camera who has so many exposures to make, and makes them, is not aimed at here, but the serious photographer who strives in all earnestness to produce a *picture*.

The fault lies in the insensible yielding to the fascination of nature's own coloring, and the absence, under this fascination, of the critical faculty of cold judgment of the subject reduced to the monotone of a photograph. It must come home to almost everyone who has ever used a camera, how keen the disappointment in the negative and the print over the recollection of the original.

Here then it would seem is the opportunity for pointing the moral.

Learn to translate in black and white: cultivate the judgment solely in this direction from the first, as an engraver studies to reproduce the painting he copies on his plate or block, and composition will naturally follow.

What amateur cannot recall, if he has ever accompanied an artist, the one with his camera, the other with his sketch-book, the enthusiastic urging of the artist to photograph some scene or phase of nature, glorious in its coloring, but which the experience of the photographer will not allow him to take, knowing that everything which made the beauty of the scene would be lost in the photograph.

Too much stress is laid upon the amateur to study composi-

tion; seldom, if ever, is he urged to study *expression*, and it is *expression in black and white* in which the average photographer betrays the greatest weakness. They are advised to study this painter and that, but rather let them study the works of the best etchers and engravers. The keenest study of Turner and Constable will not help to make a good photograph, as a picture in itself; but a serious study of the *engraving* of these masters could not fail to help every photographer in the knowledge to be gained of how beautifully the expression of color can be given in monotone to the most wonderful phases of nature.

Let the photographer equally study his failures in his disappointments with what charmed him so much on his ground glass, and learn to idealize his subject with each photograph he sets up his camera to take in cold black and white, and he will learn to reject as well as choose for the monotone alone, and soon to produce photographs that will be masterpieces in expression as well as composition.

H. Edwards-Ficken.

A NEW METHOD OF STORING NEGATIVES.

Finding the general method of putting negatives in a numbered envelope and making a list for reference rather slow, I have adopted the following plan, which I find easy of execution and excellent in results.

I get from the paper dealers a fair quality of white, smooth paper, which may be bought for from 15 to 20 cents per dozen sheets, 18 x 22, and after making a tin pattern of the different sizes, cut the paper ready to fold in the envelope form. Brush on the part of the paper equal to size of negative, with a prussiate solution, and dry. Expose before folding, placing some opaque medium, like black paper, between the negative and paper, leaving a clear space for memorandum, such as are commonly found on envelopes made for holding negatives.

Fold and paste, using any good starch or flour paste.

They can be made at odd moments, and is not so much trouble as may seem.

Common wrapping paper can be used by adding from 10 to 15 grains of dextrine to each ounce of blue solution. Dissolve dextrine, and add iron and potash. I use warm water to dissolve dextrine, adding the iron and ammonia after it has dissolved. I find 3 of iron to 1 of potash works well.

E. W. Horne.

AN EXPOSURE RECORD.

Luck seems to be the foundation-stone upon which most amateurs build their success, for it is a hard matter to find one who keeps a record of his exposures and results. I have improvised a fifty-cent leather-covered butcher's book into a record for exposures and negatives, which will date back for some time and continue for the future. With the aid of a a set of rubber type the pages are divided as follows:

Date, Oct. 15, '92. **No.** 3. **Plate,** Seed 6½ x 8½, No. 26. **Stop,** *f*/22. **Exposure,** 1 second. **Remarks:** "Storm King;" white house center; sky overcast. Good results. **Negative No.** 140.	**Date,** Oct. 16, '92. **No.** 11. **Plate,** Cramer 5 x 8, No. 60. **Stop,** 32. **Exposure,** Instantaneous. **Remarks:** "Group Cows," one with white feet; sun good. Results excellent. **Negative No.** 142.
Date, Oct. 16, '92. **No.** 4. **Plate,** **Stop,** **Exposure,**	**Date,** Oct. 16, '92. **No.** 12. **Plate,** **Stop,** **Exposure,**

After placing the date, I put on the line following No., the number of holder containing that plate, then the size, make and rapidity of plate, and am then prepared to go into the field without fear of exposing the wrong plate, making note of the stop I use, and in that way become well acquainted with my lens. Follow that up with time of exposure as per sketch above.

Under remarks, I can keep track of the subject and any particular point to watch for development, and note of the result when developed. Lastly, I set the number of the finished negative before putting it away. By this means I can always put my hand on any given negative, and at the same time know under what conditions it was taken by simply referring to the corresponding number in my exposure-book,

and can recommend it as the surest way of becoming thoroughly acquainted with your lens as well as the working qualities of the different make of plates now on the market.

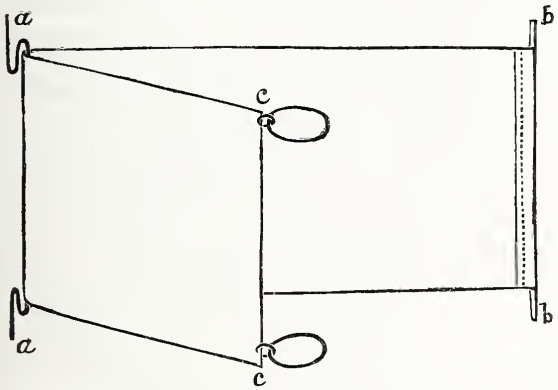
Geo. E. Merry.

A STEREOSCOPIC DIVISION SCREEN.

As STEREOSCOPIC photography is becoming more and more popular every day, I will give the readers of this volume a description of the simplest and most efficient division screen.

The only materials necessary are, a needle and thread, a suitable piece of cloth, two pieces of stiff wire, and two small rubber bands.

The ends of the wire, *a*, *a*, are put into suitable holes in



the wood just back of the front board; those of the wire, *b*, *b*, are put into others made as near the seat of the plate-holder as possible. In my camera I have made little grooves just deep enough to flush the wire, right in the seat, so that the holder touches the wire.

It will be seen that when the rubber bands, connected to the little thread eyes at *c*, *c*, are attached to hooks or eyes in the camera beside the wire *b*, *b*, that the cloth will roll over the wire *a*, *a*, as the bellows is moved in or out, making a perfect screen from end to end.

The cloth must not be so short that when the bellows is distended the bands are pulled over the wire. It is also possible to have it too long. These things will be easily understood, however.

H. W. Gauld.

SUGGESTIONS REGARDING A COLOR PROCESS BY THE INTERFERENCE METHOD AND THE AID OF A CHROMOGRAM.

M. Lippman's experiments have brought us the knowledge of the fact that it is possible to impress on a sensitive plate the solar spectrum with its colors. Or, better still, composite colors have been reproduced, and this possibility constitutes, in our opinion, the means of making polychromatic prints, not by contact, but by projection on a sensitive screen.

We will now explain the process, but before going into the subject, will make clear the meaning of the word chromogram.

It designates the combination or the *ensemble* of three diapositives made from negatives representing the action of the blues, yellows and greens respectively of the original.

If, instead of reproducing direct from nature (which is no easy matter in the present condition of the Lippman process), we satisfy ourselves with combining the three negatives selected, we will have, by exposure of the positives, the three monograms, the superposition of which, by projection, must lead us to the desired impression. It remains to be decided, however, whether the three images should be projected simultaneously or whether it would not be preferable to make three successive impressions. We cannot pass a decided opinion until after we have experimented both ways, but are ready to maintain that the impression by means of the chromogram offers the advantage of working in the studio with a light to which we are accustomed, and under conditions of regularity and precision which could not be had elsewhere, whether working in or out-doors.

In the perfect knowledge of the coloring medium and of the illuminous source lies one of the principal difficulties of the method suggested. In the same way it is easier once the monochromes (diapositives) are made, to reproduce them in a studio, where everything is arranged for this experiment, and where the multiplication of an image may be obtained in any quantity desired. Let us suppose that the diapositive of the red is projected alone, with a red light, on the sensitive plate, (this being sensitive, of course, to red, it will be easy to determine the time necessary for this impression), the development of same will produce a negative image all red, similar to that which was seen on the screen when focussing. This impression is laid on one side, and the same operations performed with the other two diapositives of the greens and yellows. We

will thus have three films, which, being isolated from their supports (which is easily done), may be superposed, giving, if viewed at a certain angle of incidence, and by reflection, the sensation of the complete colors of the original. It would even be possible to project successively the three images on the same plate, and exactly in the same place, which would afterward be developed, thus obtaining the complete result. If an apparatus were made with exact separators for the three images, reproduction of the polychrome could all be done in one; unfortunately the image in composite and simple colors, so far as obtained by Messrs. Lippman & Lumière, can only be seen at certain angles of incidence. There lies the difficulty, and we do not know whether this will ever be overcome. By using bichromatized albumen or gelatine, directly visible images may be obtained, but the yellow color of the sensitive preparation arrests the radiations of the blues, and the definite image lacks in its radiations, and is therefore incomplete. On the other hand, the effect of the different colors is only produced by the variation in the indices of refraction of the blending of the interferential net-work, it being necessary to wet the coating of mucilage so that the difference may be manifested, and, even so, it changes according to the degree of humidity. It is out of the question, therefore, to dream of the bichromatized mucilage as a coating of a product. Sensitized with chloride or bromide of silver (collodion or gelatine) is much to be preferred, especially now these preparations are made almost colorless, which is very desirable, having in view the reproduction of all the colors.

To meet with success the sensitive preparation should be free not only from transparent grain, but it must also be orthochromatic to all colors, or, in other words, it must, at the same time, be sensitive to the action of the blues, greens and yellows.

The use of screens would not be sufficient. The screen does not render the plate more sensitive to either of the other colors. It only retards or suppresses the action of the blues. The plate, besides, would receive a projection of the violet-blues during too short a time and the projection of the green about eight times longer, while the red is about one to two hundred times longer than the first impression of the violet blues. The plate can be orthochromatized with cyanine and erythosine, this being sufficient to render it sensitive to the greens, yellows and reds.

The operation is successive,—a plate already sensitive to red

is made sensitive to yellow. Our several attempts in this direction have succeeded fairly well. Without having entered yet into the experimental study of the method suggested, we are unable to give precise rules, but the *modus operandi*, although important, considering the delicate nature of the subject, requires only investigation after the principles have been demonstrated.

We are inclined to believe that polychromatic images are better obtained by successive superposition of the effects or impressions than by the direct reproduction of the objects themselves. The multiplicity of the composite colors of nature will then be reduced to three, more or less, if the coloring medium selected can be brought near enough to their monochromatic type. They will succeed in using coloring medium very near to the tint of the spectral zone desired to be imitated, and in this case the mingling or blending of the interferential fringes will be less complicated.

I give out this idea for what it is worth, reserving, for opportunity and time, all experimenting, so that I may myself be in a position to judge of it, and to demonstrate with more certainty what may develop if the first results correspond to my expectations.

Léon Vidal.

CARBON PAPER FOR AMATEURS.

During the last few years, since amateurs and amateur societies have so increased in numbers, many old but valuable photographic processes have been revived, some of them having been laid aside because of being too tedious to work, others perhaps too expensive to the practitioner; moreover, is it almost certain the pecuniary circumstances of the amateur permit him to experiment more extensively than the professional and to investigate novelties more thoroughly. The results of such endeavors have proved to be very useful to all. The finding of more practical manipulations have encouraged the bringing forward of new methods and improved apparatus are among them.

It is my intention to return here to a process not by any means sufficiently introduced to, or adopted by, amateur circles, but certainly destined to take at last a foremost place in dilettante photography.

I speak of the carbon or pigment printing process, which when properly practiced allows of manifold application.

But why has not this process been more extensively adopted,

Miss S. J. Eddy, Photo. (Copyrighted)

"SPRING"

let me ask. Is it perhaps because, with carbon paper, the amateur cannot at any time take a sheet of sensitive paper from the box and finish a print at once, or is it an objection to sensitize his own paper, or the probability of meeting with innumerable difficulties in the working? Commercial carbon paper, of different quality and properties, presents the first difficulties to the amateur, and to select what he really does want is almost impossible. But to facilitate amateur work and to encourage the adoption of the process, I desire to give here a few points on the preparation of the paper, to those who I presume take any interest in carbon printing. The process should be known to them theoretically at least, even if practical knowledge of it is not yet acquired.

To work successfully with any process requires in my opinion first a thorough knowledge of the material employed. The self preparation of necessary compounds is of equally high importance.

In my own process the preparation of the paper occupies the first place. Photographic books and the literature of the day almost generally advise the purchase of commercial paper, but to make it in our own laboratories is not at all as difficult as it is said to be, if sufficient space and room is at the amateur's command. To be successful in carbon printing it is of great advantage to give the paper exactly the tone that is wanted. A few modifications in the proportions of the colors used, the percentage amount of the potassium bichromate permit a great latitude in the selection of negatives for carbon printing. These should be dense rather. A negative printing upon albumen a rather harsh proof, presents perhaps normality for carbon printing, for such negatives are best adapted for the process.

The solution for this paper is made of a medium sort of gelatine. First-class gelatine gives inferior results. For the coloring of it liquid India ink, or any mineral color rubbed down finally with water, glycerine and alcohol does very well.

Ferreo di sienna gives a sepia tone.

These colors may be prepared by any color manufacturer and are finally to be kept in tin boxes. The ultimate color mixture, to suit the character of the original, I prepare myself.

A good and reliable proportion for the preparation of the solution is 300 grammes gelatine dissolved in 5 liters of water, 50 c.cm. of gelatine and of color as much as is necessary, but diluted with 1 liter of water. It is advisable to add one-half c cm. of carbolic acid to each liter of solution; with it the decomposi-

tion of the gelatine when drying is arrested. It is impossible to give the required quantity of color distinctly; it depends much upon the density of the color stuff. One drop of the solution upon a piece of paper should be opaque, if not so, more color should be added.

The selection of paper is not of great importance, Rives, Steinbach or any of the popular resin paper answers.

To coat the paper, wet sheets of it are squeegeed upon plate glass, a wooden frame 3 c.m. in height is attached by means of clips, and so much of the gelatine solution is poured on that it stands at 3 c.m. in height. The plate is then placed upon a leveling stand, and as the gelatine solution was tolerably cool when being poured on, it will chill soon. The wooden frame is now removed, the sheet stripped from the glass. fastened upon card-board and dried spontaneously in the dark-room. In about three days the paper is dry and ready for use,

Whoever works with this kind of paper will soon learn of its advantages over the commercial article.

No preliminary preparation, no substratum is now necessary, and the transfer pictures adhere without support.

In selecting the proper kind of gelatine it is highly important to notice that neither alum, tannin, or similarly acting substances are contained therein.

To anybody interested in the making of this paper I offer my advice and assistance.

Emil Obernetter.

APPARATUS FOR MAKING LANTERN SLIDES AND FOR COPYING.

The apparatus shown in the adjoining sketch enables the operator to use his own camera, and has advantages not found in cameras ordinarily sold for making lantern slides.

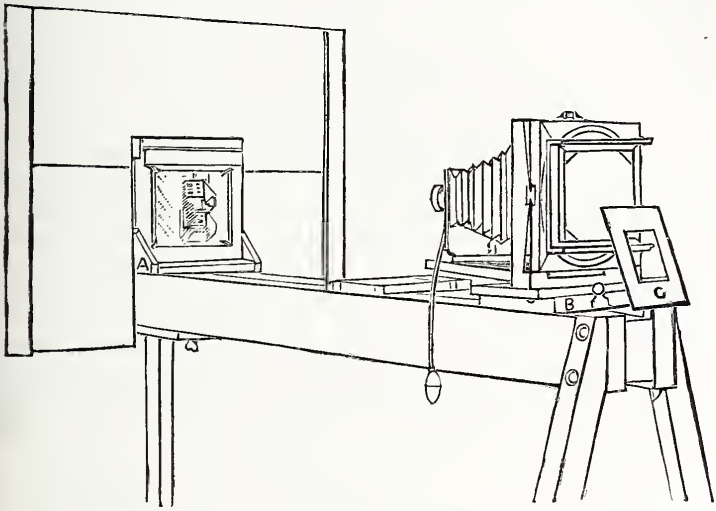
The stand is made of two lengths of pine bolted together, space being left for the carriers A and B to slide in. To these slides legs are bolted one on one end, two on the other.

The frame to hold the negative is recessed and the latter is held in place by four brass clips.

Behind the negative is a ground glass, and both are framed by half-inch boards so that when the negative is placed against the window, light is excluded from the lens that would otherwise enter and tend to dull the image in the camera.

The head A holding the negative is capable of adjustment two ways, that is, to and from the camera. The head B has

the same adjustments. but, in addition, it can be moved four inches to the right or left at right angles to the negative. This adjustment, together with the up and down movement of the lens, which is found in nearly all tripod cameras, enables the operator to so adjust his camera in reference to the negative as to take in or leave out any part of the latter he wishes and at the same time keep his negative, lens and plate in exactly parallel planes.



The mat C shown in the cut is laid against the ground glass as a guide to enable the operator to place the image directly in the centre of the plate. For lantern slides, the lens with which the negative has been made can be used to advantage, and if it is a double combination lens it can be worked at full opening and a long exposure is thus avoided.

The apparatus will be found most useful in making lantern slides in which certain parts of the negative need an extra long exposure. Many amateurs will recall negatives they have made containing clouds that have been lost in the effort to work up the balance of the plate to full density.

With the camera fitted with a pneumatic shutter the operator can handle the shutter with one hand and shield parts of the negative with a dark piece of paper with the other hand, and so work out clouds that it would be difficult to bring out in any other way.

R. Eickemeyer, Jr.

ON SOME USES OF PICRIC ACID IN PHOTOGRAPHY.

Staining plates to prevent halation.—It was from a French source that I gained the first hint as to this use of picric acid, but I cannot at this moment remember the authority.

A cold saturated solution of picric acid is made—picric acid is soluble in cold water to about the extent of one per cent.—and ammonia is added till the solution distinctly smells thereof. Plates dipped for two minutes or so in this solution and dried resist halation to a remarkable extent. To give some idea of the amount of resistance given by this treatment, I may say that it is about as difficult to produce halation on picrated plates as on the Sandel *double* coated plates, but not nearly so difficult as on the *triple* coated plates of the same make.

The exposure is prolonged a little, but not much, if due precaution be taken in the development, but such precaution must be taken. The reason is that the picrate of ammonium in the film acts as a very powerful restrainer, and that, if the usual developer be used, we get a very hard negative giving the impression that it was much under-exposed. A developer that is commonly used with a restrainer—pyro with ammonia for example—may simply be used without the restrainer. A good developer is eikonogen with a large quantity of carbonate of soda and no restrainer. The following may be used:

Eikonogen	10 grains
Soda (crystallized)	25 grains
Sulphite of soda	25 grains

to each ounce of developer.

There can be no doubt that a plate useful for many purposes could be made by adding picric acid to the emulsion before coating. The quantity of picric acid needed does not add appreciably to the cost of the emulsion.

Picric acid for orthochromatizing plates. This is not one of the *uses* of picric acid, for picric acid has no orthochromatizing effect, yet I have several times seen it recommended for this purpose. I cannot very well understand why it should have been recommended, as it is the very last coloring matter that might be expected to have the desired effect. It has long been demonstrated that dyes sensitize to those parts of the spectrum that they absorb. Now, as will be seen presently, picric acid, or picric of ammonia, absorbs the extreme violet and violet-blue of the spectrum only, the very parts the sensitiveness of which we have to *repress* in orthochromatic work.

The fact that such dyes as have an orthochromatizing effect, sensitize to the parts of the spectrum that they absorb, is better illustrated in the case of cyanine than in that of any other dye that I have experimented with. This is probably because the absorption band is so very clearly marked in the case of this dye. If the light passing through a solution of it be examined by the spectroscope, it will be seen that there is a very well marked band of complete absorption extending from the orange-yellow, through the orange into the red, but not extending to the extreme red.

I may mention that for sensitizing to the whole of the visible spectrum (with the exception of the extreme red, to which ordinary plates are not sensitive, namely, to green, yellow, orange and red) a mixture of cyanine and eosine has a better effect than that of any one dye or other combination of dyes that I have tried. Plates so sensitized are very useful for copying pictures of some kinds. To get the maximum effect, the plates are first dipped in a *very* weak solution of nitrate of silver for five minutes, and then in a solution of the two dyes.

Plates treated in this way come nearer to the great desideratum of a plate that will give true color values without a color-screen than any other that I have tried. Even in copying difficult pictures the very lightest screen is sufficient, or it will do to work in gas or lamp-light without a color-screen.

The plates are very difficult to work, however, and I have no idea whether they will keep or not. I have always used them either wet or soon after they were dry.

Picric Acid for Color-Screens.—Picric acid (or picrate of ammonium) would appear to be of exactly the right color for color-screens to be used for orthochromatic photography.

It should always be borne in mind, in this connection, that we want to cut off with the color-screen the greater part of the violet light, a great part of the violet blue, and some of the blue, but none of any other color. Now most color-screens—notably those made with aurine—are really of a very dilute (if the term may be permitted) orange yellow color. This means that they cut off some green and yellow light as well as some blue and violet. This the light lemon color of picric acid does not do.

The following experiment is an instructive one. A plate is coated with a solution of gelatine and picrate of ammonia in the manner described further on, but the coating is made thick at one end, thin at the other. This is done by slipping a thin

wooden wedge under one end of the plate, whilst the latter is on the leveling slab, till the solution has left one end entirely, or almost entirely.

This plate, when dry, is examined by the spectroscope, placing it between the spectroscope and the light and slowly passing it along, so that the light passes first through the thinnest part of the film, last through the thickest. The appearance is that the light is gradually cut off from the extreme violet end of the spectrum. First the extreme violet goes, then the violet, then the violet-blue, and, with the thickest film possible to make in the way described, the greater part of the blue, but no other color is perceptibly affected, not even the blue-green. I have an advertisement printed in a violet-blue ink—a pure violet-blue, not a mixture of blue and red; evidently an aniline, or at any rate a coal-tar product—color. This, looked at through a moderately thick picrate film, looks as black as printers' ink.

A comparison of picric acid and aurine was made by the aid of a cell with plate-glass sides, solutions of the two substances being used. The picric acid was found to be immeasurably superior to the aurine. The highest tinge of it had as great an effect as quite a deep colored solution of aurine, and, moreover, the picric acid gave truer color values than could be got by *any* strength of aurine solution.

A glass cell filled with a solution is an excellent thing for experimental work, but it is most awkward for practical work. This set me to work to try to make picric acid screens. All attempts to get a clear, transparent film with varnish or collodion failed. The films were always muddy. At last the following method was found successful:

As for dipping plates, a cold, saturated solution of picric acid is made, and ammonia is added till picrate of ammonia is produced, as indicated by the smell of ammonia;* to each ounce of this solution are added 10 to 15 grains of hard gelatine. This is allowed to swell, and is melted by heat. Four or five per cent. of alcohol is added, the solution is filtered through cambric, and *patent* plates are coated with the solution, exactly as dry plates are made by coating with gelatine emulsion.

Plates of different intensity can be produced by giving dif-

* In the case of a solution to be used for dipping dry plates in, the necessity for adding ammonia is evident. The presence of an acid in the film would be objectionable. The advantage of the ammonia in a solution for the manufacture of color-screens will not at first be evident, picric acid and picrate of ammonia giving solutions of exactly the same color, but my assistant, Mr. Arito, has shown that a much clearer, more transparent screen results with picrate of ammonium than with picric acid.

ferent thicknesses of coating. A very thin coating only is needed for orthochromatic purposes with any orthochromatic plates I have ever used. With thickly coated plates very fair orthochromatic results can be got on ordinary dry plates, but of course with a very greatly increased exposure.

When the picric plates are dry they should be varnished with great care.

It may be objected that "patent plate" is not true enough for color screens; that only "optically ground" surfaces are good enough, and it is quite true that screens made as I have described, and used near the lens, either in front of or behind it, perceptibly degrade the definition. To overcome this difficulty, the screens are made of the full size of the plates to be used, and are placed in the dark slide in front of the plates to be used, picrate film to gelatino-bromide film, an adjustment equal to the thickness of the screen being, of course, made after focusing unless a special dark slide is used. Working in this way there is no perceptible degradation of definition.

It is to be feared that in these degenerate days it is not every photographer who can coat plates with the perfect evenness that is necessary for this kind of work. I believe professional plate makers might find it pay them to coat such plates of the standard sizes and of different intensity.

It may be objected that two plates cannot be inserted in most dark slides in the way described. They cannot in all kinds of dark slides, but they can in most though; in the case of many double dark slides only one picrate screen and one dry plate can be used in each.

Picrate Plates as Dark-room Lamp Media.—I have made a few experiments with a plate coated with the solution above described, as the transparent medium for a dark-room lamp. The plate was rather thinly coated. The light appeared nearly as white as that of common gas without any shade; but with the same amount of *visual* light, it was found to be *very* nearly as safe as the light filtered through red flashed glass that had been picked out of a large quantity by spectroscope tests as being particularly safe, and the light yellow light is much the more pleasant to work in.

I am proceeding with experiments with plates more thickly coated and with several in front of each other. I hope thus to get illumination of a light yellow color that it will be a pleasure to work with, and that will be at least as safe as any other kind of light.

W. K. Burton.

BLURRED PRINTS AND THEIR CAUSE.

Not long ago I was paying a visit to a well-known mercantile photographer of this city, when his assistant brought into the office about a dozen 14 x 17 prints which had just been mounted; they were sharp in the centre but blurred at either end. My friend called down his printer and showing him the prints upbraided him for his carelessness in not examining them while printing, thereby letting the paper slip in the frames.

After he had promised to be more careful and returned to his work, our conversation drifted on to printing, and picking up one of the prints he handed it to me, saying: "What a pity men were so careless sometimes, for once in a while a whole day's printing would be spoilt by blurring."

I looked at the print and asked him if he did not know the real cause, and when he said "No," I was surprised; then I told him that his printer being in a hurry to get his negatives out had used the paper right fresh from the fuming box without drying.

Now a 14 x 17 piece of paper will shrink over an eighth of an inch, and if put on the negative damp, and then put out to print, it contracts while printing and causes the blur; therefore, if you want clear sharp prints, always dry your silver paper before printing, and you will be saved many poor prints, which have heretofore been laid to weak springs in the printing-frames, and your printer.

Louis Clarence Bennett.

FINGER PRINTS.

On more than one occasion during the past year, I have suggested to photographers that they would find it lucrative if they persuaded customers to have prints taken of one or more of their fingers, and enlarged photographs of those prints supplied to them. The object would be to have an unchangeable personal record in a clearly legible form, that will ever after serve as a sure means of identification.

As an example of what is meant, I send a photograph of the central portion of the print of my own forefinger enlarged six times. The lines in the impressions of younger persons than myself, say up to 50 years of age, are much clearer, but

mine will serve for illustration. Fully twenty-five different points of reference will be found in this print, every one of which must have been persistent from birth, and will continue unchanged till death, and afterwards until decomposition shall have effaced them, judging from the large body of evidence in respect to persistence that is published in my "Finger Prints," and subsequently in a supplementary chapter entitled the "Decipherment of Blurred Finger Prints." Such points of reference exist wherever ridges begin or end; it does not matter whether this appears to take place independently or through bifurcation. Islands and inclosures are included in this definition. An island will be seen at 4 D, and an inclosure at 3—4, A—B. In order to take clear impressions it is necessary to ink a piece of glass plate with printer's ink, by means of a printer's roller, and to do this very uniformly and *thinly*. The coat of ink should be so thin that, when the inked plate is held between the eye and the light, its tint should be of a smoky yellow, very far from black. Press the finger first on this inked glass and then on a porcelain palette, such as is used by painters in water colors. The extreme whiteness of the palette contrasts well with the impression upon it, and makes photography easy. For purposes of preservation, take one or more other prints on card or paper.

RIGHT FOREFINGER OF FRANCIS GALTON.
(ENLARGED SIXFOLD.)

Francis Galton.

PHOTO-ENAMELS.

Many formulæ are extant for producing photo-enamels, or burnt-in porcelain pictures, yet we seldom see such work exhibited in public or displayed in the rooms of the amateur.

The reasons are not far to seek. They are two-fold. Many of the published processes or methods are too intricate and require an enormous amount of technical skill and delicacy, thereby rendering them entirely unavailable to the great majority of photographers; others simply will not give the results claimed for them and are inadequate to accomplish the object aimed at.

It is admitted that a well-executed porcelain picture, good both as to subject and technique, is an admirable thing; remembering then its absolute permanency as to color and brilliance, it follows that it would be well worth the while of the amateur who has the interest of his art truly at heart, to perfect a process which, in the hands of the average practitioner and with the expenditure of but little more time, skill and money than is requisite for the production of a first-class platinum print, would produce artistic enamels.

I have devoted some time to the development of such a process and, while I cannot yet boast of having reached the goal, I have advanced far enough to be able to feel assured that the goal is attainable. It is my aim here to give a few notes of how I think the desired object can and will be accomplished in order that some reader may be induced to take up the work and by the application of patient research and persistent experimenting soon carry it to a happy conclusion.

The first object should be to produce an enamel in monochrome, preferably the rich black of platinum. This has been hitherto attained by coating the porcelain substratum with a silver emulsion, the positive thereon produced being subsequently toned in a platinum toning bath and then fired in. Enamels in monochrome have also been made by the carbon process, dusting-on bichromate processs and other still more complicated and precarious methods. None of these are satisfactory; they all lack one or other of the indispensable elements of simplicity, ease of manipulation and certainty of final results. I believe that a process possessing all of these elements can and will be evolved from one of the direct printing platinum processes as now universally used for producing positives on paper. The details must be worked out in two directions. If the porcelain substratum presents a flat surface

the sensitive platinum solution should be applied direct, the so sensitized surface printed under the negative, developed, fixed, washed and then subjected to the glazing fire of the furnace.

It is not easy to apply the sensitizing solution to glazed porcelain. If attempted without previous preparation of the surface, it will be found on drying to present a crystalline appearance which will not print satisfactorily; furthermore, hot development will cause it to float from the support.

I believe, however, that this trouble can be avoided by first coating the porcelain with a film of arrowroot, gelatine or collodion before applying the sensitizer.

Unglazed porcelain, which is very easy to coat with sensitive solution, and upon which I have produced pictures which were good before firing, is entirely out of the question in connection with a platinum sensitizer, the iron salts of which form a chemical or physical combination in the body of the porcelain which will not yield to the most vigorous treatment with hydrochloric acid, and which gives the porcelain a strong and exceedingly disagreeable brick-red tone in the firing.

When the enamel is to be produced upon a surface other than flat, different means must be employed, and I believe the solution of the question thus presented will be found in following a method analogous to the transferotype process, using, however, not a bromide of silver emulsion, but the usual platinum sensitizer applied to the paper over the intermediate soluble stratum, which makes it possible to transfer the print from the paper substratum to the porcelain surface.

As in all untried fields, simple subjects should be at first attempted, until a practical method has been developed and sufficient familiarity with its working attained.

Platinum is insisted upon as the only trustworthy pigment, as the deposited metal which forms the picture withstands the hottest fire of the muffle, and the depth of the finished enamel can with certainty be determined by the preliminary operations.

It is not necessary to make elaborate preparations for firing; there are several professional porcelain firers who will do that part of the work at a trifling charge, and the acquiring and operation of a furnace, if that should be deemed at all desirable, may well be deferred until the proceedings anterior to the firing stage have been brought to perfection.

Monochrome enamels have been alone contemplated in the foregoing suggestions, but the work need not stop there, as I believe that the entire range of vitrifiable colors may be made

to yield their aid to photography; and enamels, brilliant, natural and artistic, be yet produced without familiarity with the artist's brush. The space which can be allotted to me here would not permit elaboration of the process I have in mind, and it must, accordingly, be reserved until a future occasion.

Louis B. Schram.

"HANDS OFF."

A VERY grave fault which becomes a habit with the operator, is his manner of handling the sitter.

For the purpose of this article we will assume the subject to be a lady.

She enters the operating-room under a feeling of nervous embarrassment, and frequently says, because she don't think of something better to describe the feeling, that she would as soon go to a dentist.

Here is the opportunity to make some pleasant comment which would lead to reassuring the lady and dissipate the feeling of constraint; but he has heard about the dentist so often he chooses to make no reply, and says, Take this seat! If she be young and fine looking, perhaps he will add, If you please. Now commences the ordeal with the poor victim. She is clutched by the fingers and thumbs of the operator, by the head on either side, and he proceeds to pitch it to the right, then a little to the left, then he twists it in such manner and direction as seems best to him to get it about right, then he goes to the camera, draws the focusing cloth over his head, and contemplates the image. As a rule it don't quite suit him, and he again introduces the finger ends, crushing and mussing the carefully dressed hair, when the twisting and tipping exercises are gone through again.

The muscles of the victim's neck, by a natural law of resistance under attack, become stiffened and rigid, and the very effort of producing a graceful poise, as endeavored by the operator, is defeated the moment of the "laying on of hands." Hence the failure of an easy, graceful, or restful position, as well as the impossibility of an animated or cheerful expression. And why will the photographer continue to use those "grappling hooks" year after year in the face of his everyday lessons of the great wrong? We suppose he was taught that way, and seen so many practice that method, he continues it. And we wonder will it continue down through

the years of an unborn future that the head must be clutched and fastened into an iron rest with forked points?

We read sometimes of important discoveries made, and announcements of valuable inventions in photographic methods. We have scientists, we have inventive geniuses. Now can't we find a great reformer who shall make it possible to have ladies pose without being grappled; one who shall take the photographer by the hand and lead him into a new school; a school of plausible and agreeable methods in photographic practice, where the teaching should be in the direction of refined manners and politenesss, in explaining to the inexperienced the needs and requirements in posing in a manner which should not imply a suspicion of ignorance, to set the mind quite at ease, to brush away, if possible, all tendency to nervousness, and particularly to avoid the habit of handling the sitter's head with inconsiderate freedom.

J. F. Ryder.

WHY DO WE?

Exchange ideas in *The Photographic Times* and The Annual? Yes. Well, after we have heard all about that pet developer that you are using with such grand results, would it not be a great pleasure to see a print from that fine negative? Indeed it would. You also use the best printing papers; it gives those soft tones, and then such details. Will you exchange one of those prints with some one that is using a paper that blisters, tones flat, etc.? What! too much trouble? Just take time to think about the little work required and compare it with what it would take to get that view in Maine or Texas. You know which view you want and are not compelled to take from all persons offering exchanges. Your request in the "Exchange Column" of *The Photographic Times* for a view of "Indian Life on the Plains" in exchange for a view of the "Caravels" will bring just what you want. It will be a great help to you in your future work, and if once tried you will be as unwilling to have the "Exchange Column" dropped from *The Times* as you would to have The Annual stopped. You would not like to be compelled to do all your photographing without a tripod? No. Well, have you taken a thought that with *The Photographic Times* exchange we will have a *tripod* complete? *The Times*, The Annual, and the exchange of prints will sustain you in anything that you wish to attempt in photography.

George G. Bruce.

THE AMATEUR PHOTOGRAPHER'S STUDIO—BACKGROUNDS.

Among the different styles of photographs which can tempt an amateur, there is one very much neglected, due, perhaps, to the often imperfect results obtained, and consequently disheartening to the amateur. I refer to portraits.

It is undoubtedly very difficult for the amateur to cope with the professional who has at hand a well-fitted gallery and efficient help, but with a little taste and preliminary study, the amateur can obtain results which will compare favorably with the specialist.

Without going into details as regards the condition of light, position, etc. (too extensive for a contribution of this kind), I will limit myself to that part only which I may call accessory, referring to the effect produced by the indispensable background, the perfection of which has been carried to the highest degree by competent artists, especially in America.

It is impossible to make a good portrait unless the subject is relieved by a ground harmonizing with the nature of the photograph and the style adopted. For bust vignette a graduated ground should be used, but it need not be large, and the graduations should start from the bottom up or at an angle. These different dispositions produce a variety of light effects and contrasts, but more artistic and better suited to certain models of women and children is the intermediate ground, with hazy, cloud-like effects, these being especially adapted for bust pictures. In these grounds the artistic fancy of the painter is displayed. The immediate foreground is ornamented with a few details, such as plants, rocks, and architectural subjects, very faintly outlined, but harmonizing in the whole with the rest of the design.

If instead of bust pictures the whole of the subject is desired to be taken, it will be necessary to have recourse to larger backgrounds, which must be placed at a certain distance to give an aerial effect to the subject and the ground. The sitter only should form the center of attraction, the background having no other object than to complete the photograph. The fashion of late seems to run toward very light hazy backgrounds, in which the fanciful imagination of the painter is portrayed. A tree, finely modeled, a scythe, or a rustic wall, relieve the monotony and give depth to the landscape. In such a calm, inviting surrounding, with the proper lighting, the subject improves in vigor and relief. This style

of background is marvelously well adapted to the costumes of our "elegantes," and are also suited for children and costume pictures.

According to the style of the model it is easy to select the most suitable background. If this is selected with taste and judgment, you will more than double the value of the portrait. The amateur, who we will imagine is gifted with artistic taste, can with three or four backgrounds, wisely selected, change his effects and deviate from the ordinary run of combinations, thus producing, without much expense, as beautiful portraits as those made by the professional.

G. Vieuille.

SINGLE LENSES FOR ARCHITECTURE.

As an article for The Annual is nothing if not practical, I am about to "raise my parable" upon a subject on which my voice has been heard before. During the present plethora of inventions in new optical photographic constructions, which have only become possible by the advent of the Jena glasses, there is great danger of the value of the old "single lens" being lost sight of. Old photographers remember the time when the landscape lens was the only optical tool of the outdoor photographer. They also remember the vast change that took place after the late Thomas Ross introduced his famous "doublets," which astonished everyone by their power to produce straight lines as straight lines, no matter whether maps, plans, or architectural subjects. He and others improved on the original designs for this type of lens till at last almost everyone looks upon a double lens with central stops as a necessity for the production of straight lines. Now this is a great error. Everyone who owns a doublet of the symmetrical type has in his possession practically two lenses equally adapted for dealing with architecture. Let anyone unscrew the front lens of his doublet, remove it, and use the back lens alone, and he has a valuable landscape lens of almost exactly double the focus of the unaltered compound. If he try it upon buildings he will find that traces of curvilineous distortion will, in most cases, be impossible to find. The point to bear in mind is that only the center of the field is to be employed. But it will at once be recognized that the center is the only part likely to be used. Thus, taking a 10 or 12 inch focus, the symmetrical lens as a standard one to use for a

12 x 10 plate (and that would give a very fairly wide angle) we should, when using half of it, that is to say, one lens only, have a 20 or 24 inch focus, capable of covering much more than a 12 x 10 plate. This would often be very valuable if only for the sake of the larger image it would give of more distant objects. Doubly valuable will it be when it is noted that it will take a view of a building which may occupy a considerable portion of the plate, and with lines in which no ordinary observation will detect any deviation from absolute rectitude of linear delineation. Two things are to be remembered. First, the focus of the single lens should be about double the length of the long side of the plate it is used with. Second, the sliding front must not be used more than about an inch away from the center. Finally, it should be said that it will be needful to obtain a small additional screwed tube for lengthening the body of the lens for the purpose of removing the stop to a greater distance from the lens for the purpose of avoiding flare. If any reader will take the trouble to experiment with his lenses under the conditions I have described, he will be both pleased and surprised at the rare power he finds placed in his hands at a cost which is absolutely trivial.

G. Watmough Webster, F.C.S.

SUMMER DARK-ROOM WORK WITHOUT ICE.

My summer experience has been unique. In former years, living in the North, with water running from the hydrant at about 60 degs. Fahr., even though the thermometer did go up to 100 degs. in the skylight, with ice-water to dilute the developer, and the acid chrome alum fixing bath, I could always rub through without loss.

But in the South here it is different. While the thermometer never in an ordinary shade gets above 93 degs., it goes up to 90 degs. nearly every day; and with the water-pipes near the surface the average temperature of the water is 85 degs. Under these conditions a different method of working is necessary.

I have a theoretical objection to the use of an ice-cold developer to start a plate in. We all know that with two plates of a given equal exposure, if one is developed at 70 degs. and shows correct timing, the other being developed at 40 degs., it will be under-timed. To my mind the best results

P. Goerz, Photo.

A DISASTROUS BALLOON ASCENSION.

(See article.)

(with pyro) are produced when the exposure and proportioning of the developer are such that the plate gets its detail in the first half of the development, and its brilliancy in the last half. Now, by starting a plate in ice-cold developer, in a room at, say, 95 degs., this process is reversed; the plate is restrained to start with, and as the temperature increases the tendency is to overcome that restraint, and the result is a lack of gradation in the lights, with possible veiling of the shadows.

Therefore, I have adopted in my practice the habit of using things as cool as I can, but never icing the developer unless in case of an over-timed negative (which rarely occurs in professional practice); and under these circumstances the astringent properties of the pyro always keeps the plate intact until it reaches the acid fixing bath, and it is safe there as long as I care to leave it.

But when the hot weather came and with it hot water there was the rub: how to get the plates washed; for no matter how long they laid in the fixing bath they would always soften in the water before they were washed enough. I set to thinking: alum alone was not enough, so I tried a small quantity of sulphuret of potassium in a saturated solution. This hardened them so they could be dried by heat at once, but the plates had to be washed at least five minutes before being put in it; besides it was unpleasant and unhealthy to have sulphureted hydrogen in the dark-room. Then I tried alum and tannin, this was good, but the plate had to be kept in motion or the action was uneven. At last I tried (I don't know why), alum and sulphite of soda, and that filled the bill completely. The plates could be put directly out of the fixing bath into the solution (a little rinse is more cleanly), and if left there for fifteen minutes could be washed and dried by heat. Ordinarily I leave them ten minutes and wash and allow to dry spontaneously, which they do very quickly, without a frill, soft spot, bubble, or blister. I find, moreover, that the negatives thus treated are not spoiled for subsequent operations, for they take the pencil in retouching as easy or easier than ordinarily, and can be etched or scraped with facility; they do not need varnishing to keep the paper from sticking, and I had no difficulty in intensifying one a few days ago.

The solution I use is a mixture of four parts of a saturated solution of alum and one of sulphite of soda saturated solution. The precipitate hurts nothing if it is carefully washed off.

R. W. Harrison.

A DISASTROUS BALLOON ASCENSION.

"HUMBOLDT," a huge balloon, the property of the Society for the Cultivation of Aeronautics, was intended to ascend on the 28th of March, 1893, from the grounds of the Imperial Physico-Technical Institution of Charlottenburg.

The mammoth bulb rose first in a direct vertical current, but a strong northeasterly breeze changed its course, and depressed its original motion to such an extent that the balloon was forced toward a tall chimney, was ultimately caught by a lightning rod, by which means it was rent, an aperture of considerable extent being the consequence.

Notwithstanding this seemingly fatal disrupture the balloon rose, and, by the skill of the navigator, a First-Lieutenant of the Prussian Engineer Corps, was kept afloat until it landed, after nine hours, near the town of Annaberg in Saxony.

In Fig. 1 of our illustration we show the compact of the balloon with the lightning rod, and the rent in it.

Figure 2 illustrates how the balloon ascends notwithstanding its injury, and also the bend of the lightning rod in consequence of the compact.

P. C. Goerz, Schöneberg, Berlin.

ON ENLARGING BY ARTIFICIAL LIGHT.

NOW THE dull season is coming on again, most amateurs will be looking out for the best way to enlarge their negatives, and so I will give, or try to give, a short description of the way I now work.

There is no doubt in my mind that daylight gives the best results as a rule, but unless one has plenty of time on his hands it is hard to be sure of getting good results, as the light will vary so according to the day; and then most amateurs have only the evening to work, and then daylight is of no use to them, and so it is to those who are not able to get time to use daylight for their enlarging that my remarks will refer to.

When enlarging by artificial light we have the following lights to use:

1. Lime light.
2. Oil lamps.
3. Ordinary house gas.

Lime light does very well indeed and is what I used to use, but if you have much enlarging to do it comes very costly,

and as I do all my printing by enlarging, I wanted to find out a cheaper way of doing so, as one cannot work for three or four hours at a time with the lime light at less than $1, which comes costly. I find it is not the exposing of the picture that takes up the time, but the composing the picture on the screen and double printing that does so, and so find it to be rather a costly way of working. I set to work to find out a cheap way of doing my enlarging, and having done so I give my way to any who cares to try it.

Oil lamps I gave up long ago on account of the smell and the yellow light they gave, and now work altogether by the use of the *ordinary house gas.* The way I work it is: I put two incandescent gas burners, one a little one side of the other and one slightly ahead of the other. They are fitted in a tray like a lime jet, and are put in the ordinary lantern just like the lime light. The light used is the Weisbach burners, but the ones I use are called the Incandescent Gaslight Burners, but are just the same, being mantles that get to a white heat when the gas is lit.

The only great fault about them is, they break with the slightest jar, but if one does not carry his lantern about or jar it they will burn for months; the two I am now using I have used since January last and have made hundreds of enlargements with them. I found that the great fault of working when I first started to work with this kind of burner was that the great heat in the lantern caused the chimneys to break, and hence break the mantles, so I made my lantern quite light-tight, with plenty of air-holes at top and bottom to cause a draft, and then tried it without any chimney or glasses, and it worked like a charm, and now I never break a mantle, but burn them until they get dirty, which they will do in time. It is hard to quite explain what I mean, but I hope I have said enough to set others to work to try this way, as after the first cost the expense is nothing. The two burners cost me $5, to fitting up of them on a tray $2.50, and I have used them for six months at the cost of a single gas-burner, which one cannot call costly.

The light is a very good and strong light, and the exposure required is not very long, as I find enlarging from a quarter plate to 15 x 12 with a portrait lens at *f*/6, the exposure required with a fair negative is from forty seconds to two minutes, and with a very dense negative up to six or eight minutes, using Eastman extra rapid bromide and developing with amidol.

When testing against lime-light (safety jet) I found that the gas-light wanted six when lime wanted forty, so that the light I get is very good and at a very cheap rate.

Any of the readers of THE ANNUAL who may read this and are at any time near my house, I shall be glad to show them how it works and how to get one made up for themselves, as I am very pleased with the way I get along with this way of enlarging, and am sure others would be so as well.

A. R. Dresser.

HOBBIES.

HE was looking very "blue" when I met him.

"What's the matter, Robinson?" I asked. "You seem to be suffering from a severe attack of 'that tired feeling.'"

"Yes," he said. "Got it bad. Life's a failure. Not worth living. Same thing every day. Swing to and fro between home and office. No variety. I'm sick of it all. Enough to make any fellow 'blue.'"

"I've got a sure cure for you, Robinson, if you'll take the treatment," I told him.

"No, sir; I've tried 'em all. Nasty mixtures at a dollar a bottle. Bitter pills, too. Bah! No good."

"No, Robinson; what you want is a 'hobby.' Become thoroughly interested in something outside your business. Botany, geology, chemistry, electricity, bee culture—anything to divert your mind and fill in spare time. Five years ago I had a bad attack of 'Blue Fever.' Bought a camera and life became rosy again and has been so ever since."

"Photography is an 'all round' hobby. No matter whether you are interested in geology, botany, chemistry, the microscope, telescope, or anything else, the camera will be a constant companion in your studies, enabling you to put on permanent record the growth of a plant, the formation of a crystal, the development of an insect, or the changing phases of the solar system. Your camera will lead you through silent woods, by still waters, across dew-shining meadows, along Alpine paths, and by the surging sea. Photography will breed within you a deep love of nature, a feeling of pride for your native country, and reverence for that mysterious thing (which now you treat so lightly) known as life."

Last week a stranger approached me; called me by name; shook hands heartily, and thanked me for a dose of medicine

I prescribed for him two years ago. I told him he must be mistaken. I lacked an M.D.

"You don't remember 'Robinson'?" he asked.

"Yes, but the Robinson of old didn't have that spring in his shoes; that color on his cheek, or shimmer in his eye. Been abroad?"

"Yes, followed your advice; bought a camera. Got interested; and the thing wouldn't let me rest until it had me make a series of studies of Flemish peasant life; then a trip to Norway; and we have been on the go ever since. I showed my 'Flemish' studies to a New York magazine publisher, and he has kept me busy poking my camera in out-of-the-way corners of Europe all last year. And this, my boy, is life."

Moral: Get a hobby, and ride it.

W. N. Jennings.

ACME EMULSION PAPER.

At the risk of writing on a subject which may also be treated by other writers in this issue of The Annual, I will briefly state my experience with this invaluable paper. It is simply a paper coated with salted gelatine instead of albumen, and, in my opinion, is superior to the latter in several respects. The formula for sensitizing and toning the same has been published in both the reading and advertising columns of *The Photographic Times*, but as my manipulation of the paper is somewhat different from the published formula I will give an account of the process.

The advertised formula gives a bath about 45 grains strong (an acid bath). The editors of *The Times* recommend a neutral bath about 50 grains strong, the paper to be fumed thirty minutes.

I use the ammonia nitrate bath, an account of which is given on page 222 of The American Annual for 1893. The formula is as follows:

Silver nitrate	50 grains
Ammonia nitrate	30 grains
Water	1 ounce
Liquid ammonia (full strength)	3 minims

I float the paper for two minutes and *dry between blotting paper;* not bone dry, of course, but until the moisture is well

out; then expose to the air in any convenient manner, being careful not to let the paper *curl*—it must be kept flat.

I *do not fume*, although for weak negatives it may be an advantage.

Toning bath is the borax bath, same as given in formula, viz.:

Borax	6 drachms
Water	2 pints
Gold	6 grains

with the exception that I make the bath a little weaker in gold, about 1 grain to 8 ounces of water. Tones range from a brown to purple and blue, according to the character of the print and the amount of toning.

Fix same as albumen prints.

Burnish same as gelatine aristo prints—when dry.

A paper without blisters and giving the aristo affect, along with other advantages, is to be greatly desired. Here it is!

W. H. Gardner.

A FEW SIMPLE HINTS CULLED FROM EXPERIENCE.

1. *Bottles* containing materials for use (e.g. developers, etc.) in the dim light of the dark-room should differ somewhat from each other, either in the way of shape or size, so that they can be as readily distinguished by feeling as by sight. If there is any chance of your mistaking the "bromide" for the "ammonia" for instance, then tie a couple of twists of stout string round the outside of the latter so that it is recognized at once as the finger goes upward to remove the stopper.

2. *Measures.* In order to make the figures and lines more distinctly seen in dim light, grind a hard-lead (H. H. H.) pencil to a fine point and then rub it well into the engraved parts.

Make it your rule to rinse out thoroughly with two or three changes of water, every measure and dish after they are done with for the time being, and keep them *upside down* to keep out dust, splashes, etc.

3. *Dust.* When cleaning your dark-room do not select a time just before you are going to use it for changing, developing plates, etc., but at some other time when the disturbed

uncaught dust shall have had time to settle. For the floor use a wet mop, for other parts a damp duster or wet sponge, and go slowly and thoroughly.

4. *Broken glass, spent matches, etc.* Have at some convenient place (e.g. the corner of the floor nearest your lamp or window) a good-sized tin canister (old biscuit-box, etc.) into which you can at once easily drop any broken glass, matches and other *débris.* [N.B.—Many a sprained ankle has resulted from stepping on a stray cork.]

5. *Behind the shelf* on which you keep your developing bottles, measures, and other things in constant use in dim light, fasten a strip of white paper. This will enable you to see your bottles much better than when they are against a dark background.

6. *Dusting Brush.* Through the end of your plate-dusting brush pass a small key ring or wire loop, and have, at some convenient spot in the light of your lamp, a hook on the wall upon which to hang your brush, so that it may not find its way into the developing dish or wet sink uninvited.

7. Should you at any time be called away in the midst of developing a plate, pour away the developer, rinse the plate under the tap for a moment, and then place it in a developing dish and fill up to top with clean water, taking care that there are no air bubbles clinging to the film, and cover over with a dish large enough to go over all and rest on the table. You may feel quite happy in leaving your semi-developed negative to work out its way to glory in your absence. When returning to complete your work mix a fresh dose of developer, but keep the alkali well in hand and err, if at all, on the side of abundance of water.

(*Rev.*) *F. C. Lambert, M.A.*

THE MOST SIMPLE DEVELOPER.

In writing this article I shall not encroach on much of your valuable space, but think that it is the best way of letting all those who are in any way interested with the development of photographic dry plates, know its use. Having used all developers, viz., Pyro ammonia, pyro soda, hydroquinone, eikonogen, and all the latest preparations, there is not any so easy to manipulate as "rodinal," but not with the formula as given by the inventor, Dr. M. Andresen, who, I dare say, should know, and whose name everybody connected with pho-

tography must know, having found, through his researches some, or most, of the latest developing agents, this rodinal being one of them, and is a highly concentrated solution of paramidophenol.

Many who I have known to have used it, with the formula given by the inventor, say they obtained negatives with every detail, but without density.

The following formula, which is most simple, gives the finest results for all work, especially for hand-camera exposures, giving detail and density where all other developers have failed, being clean and free from producing fog.

FORMULA.

Rodinal	½ ounce
Bromide of potash (1 to 10 solution)	½ ounce
Water	9 ounces

This developer works rather slowly, but yields negatives of good density, with all detail, from any good make of plates.

It is expedient to develop further than the required density, as it looses somewhat in fixing.

Every professional and amateur that I have given this formula have testified their satisfaction with it, or I should not speak so highly of so simple a developer.

Kimberley.

MAT-SURFACE ON GELATINO-CHLORIDE PAPER.

THERE can be no question that gelatino-chloride paper is the paper of the future. As a printing-out paper it is as sure to take the place of albumen paper as the dry plates have taken the place of the wet collodion plates, the latter process being to-day only used for special purposes. The manufacturers of above-named paper are bringing it rapidly to a state of perfection in regard to keeping and printing quality that leaves little to be desired, and the photographers are getting more and more used to the *modus operandi.*

The high gloss produced on these papers either by burnishing or more so by squeegeeing the prints on a polished surface while wet, are no doubt very pleasing to the general public; and indeed this high gloss brings out the finest details, especially of smaller prints, to a great extent. Nevertheless, I think most will agree with me that, from an artistic standpoint,

a mat surface is more desirable, especially for larger portraits, white drapery and landscapes. It gives the prints that softness and velvety appearance that we admire so much in the platinum prints.

In order to produce this effect on any gelatino-chloride paper now in the market proceed as follows: After the print is mounted and perfectly dry, dip a tuft of absorbent cotton in finely powdered pumice, such as is used for retouching purposes, procurable at any dealer of photo or painting materials. With this tuft of cotton rub the face of the print lightly, until it presents an even mat surface. The only precautions to be taken are that the pumice be very fine (rubbed between two fingers it should not leave the sensation of coarse particles), and that only slight pressure be applied. If either of these precautions are disregarded, streaks or scratches will appear on the print.

S. C. Passavant.

SCIENTIFIC INVESTIGATIONS IN THE WASHING OF PRINTS.

It will be recognized as the truest of truisms when I say that the first step toward securing well-fixed prints is to avoid a parsimonious and fatal economy, in both the constituents of the fixing bath and the time allowed for its proper action together with its removal eventually from the print. It is to the last of these that I shall now confine my attention.

The times have changed since I have listened, thirty-five years ago, to a public recommendation to wash prints for at least twenty-four hours in running water to ensure the removal of the hypo, and when I trembled for the fate of a print of a subject dear to me which had received no other washing than two jugs of tepid water poured slowly over it, the action of the water being aided by well dabbing the surface and back with a sponge. That this print has stood well I have ocular proof every day I choose to avail myself of it.

Although it has, for the past score of years, been well dinned into the ears of photographers that prolonged washing is not necessary to the removal of hyposulphite from prints and that it tends to lower their brilliance, yet is it still practiced by many although probably not to the unreasonable extent it formerly was. Expedients, too, of a chemical nature to alter the constitution of the hyposulphite remaining in an imper-

fectly washed print, have been had recourse to. These include, among others, the application of peroxide of hydrogen, acetate of lead, hypochlorite of lime, alum, and others. Any of these, if properly used, will certainly decompose the hypo and render it more easily removed; but there is no doubt that water alone if applied properly will do the same.

An experiment was tried with a number of prints transferred direct from the fixing tank to a washing machine, which acted on the principle of sprays of water being driven with considerable force against the prints which, for safety against tearing, were each enclosed in a frame work, the sides of which were formed of a wide-meshed, light-woven fabric. After four minutes, precisely, they were taken out, and one of them was cut in pieces, boiled in a test tube of distilled water, which was then subjected to the usual test for hyposulphite of soda with the result that none was found present.

This experiment was repeated in another way. Two pieces of smooth board were hinged together. The under surface of the upper one had a soft pad nailed upon it, and a hole cut through so as to permit of the insertion of the end of a large funnel. The print was placed upon the lower board, and into the funnel was poured water which percolated through the pad on to the print. By means of a handle the upper board was moved up and down, as if it were a pair of bellows; thus intermittent pressure and a fresh flow of water speedily removed the hyposulphite of soda. Three minutes sufficed to enable the print to stand the iodide of starch test.

A systematic course of experiments recently conducted by Messrs. Grundy & Haddon, the Professors respectively of Chemistry and Physics in the Royal Naval College, Greenwich, have shown that 97.2 per cent. of the sulphur present in prints was removed after five minutes' washing in ordinary running water; after ten minutes' washing the percentage was 98, and that, however long afterward was the washing continued, even extending to several hours, no more of the sulphur could be eliminated.

The application of this to the every-day practice of the photographic printer is too obvious to require being pointed out.

J. Traill Taylor.

THE PHOTOGRAPHY OF ANIMALS AND ANIMAL MOTION.

Directly the amateur has mastered the initial difficulties in negative making, he commences to look round for fresh fields to work in. The greatest mistake he usually makes is in his attempts at portraiture. He thinks what a nice thing it is to be able to secure likenesses of all his friends and relations, but the friends and relations don't seem to think it such a fine thing when they see the results, and often take offence at what they imagine to be an intentional caricature.

You can photograph an animal without giving it offence; at least I have never heard one express any, and some of the most charming pictures I have seen have been of animals.

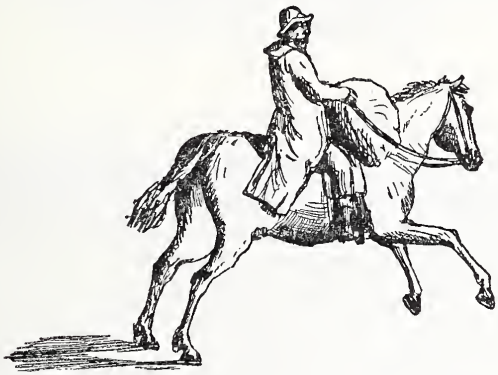


Fig. 1.

The illustrations we give on another page, entitled "A Happy Family" and "Swans," are good examples by the veteran photographer, Chas. Reid. Mr. Reid has devoted his life to the study of animals, and he possesses one of the finest collections of animal photographs we have ever seen. He lives in the little town of Wishaw, in Scotland, all among the wild Scotch cattle. Of these he has many a fine picture, although they are ferocious beasts and photographing them is not altogether without danger.

In photographing animals the true secret is to get a natural expression. Many make the mistake of trying to force the animal into place, dragging it to a place and hitting it until it

assumes the required position. The animal, of course, has an unnatural, frightened look. Kindness only will give success. Patience! You may have to wait an hour or more before you get just what you want, but this is far more satisfactory than a dozen pictures that you don't want.

Photographs of animals have been of infinite use to

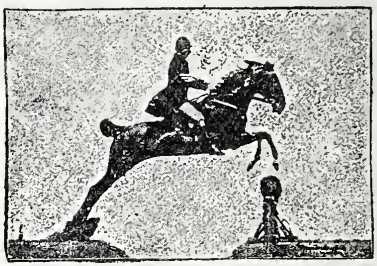


Fig. 2.

painters. An instantaneous attitude is secured which could not otherwise be copied. Mistakes have been rectified, as witness the celebrated lions in Trafalgar Square. These lions were designed by Landseer, the eminent animal artist. In these the two front paws were extended and laid flat, side by side.

Fig. 3.

In many hundreds of photographs taken of the lion it is proved beyond a doubt that the animal never assumes this attitude; one of the paws is always made to rest on its side. We can all remember the story of the celebrated artist who made a great sensation with a wonderful picture of cattle in a field. All went well, and the picture was praised by all who

C. Reid, Photo.

"A HAPPY FAMILY."

C. Reid, Photo.

"SWANS."

(See article on "Photography of Animals and Animal Motion.")

saw it, until an old farmer from the country happened by some mischance to get into the academy, and expressed his opinion of the artist when he exclaimed, "Well, I'm durned if the old fool ain't made a cow a gettin' up on his forelegs first," which, of course, considerably reduced the merits of the picture.

Had this artist employed photography to get the movements of this useful animal, he would have been spared this painful incident.

In the instantaneous photography of animals in motion the artist has received a wonderful education. In Fig. 1 we have a print taken from an old drawing. It is supposed to represent a horse in the act of galloping. Comparing this with the photographs taken, we see that the position is never assumed by the animal. In old pictures of horse-racing it is curious to see the horses depicted with hind and forelegs extended to the utmost. If a horse were by some means made to assume the attitude represented it could never move again, much less win the race.

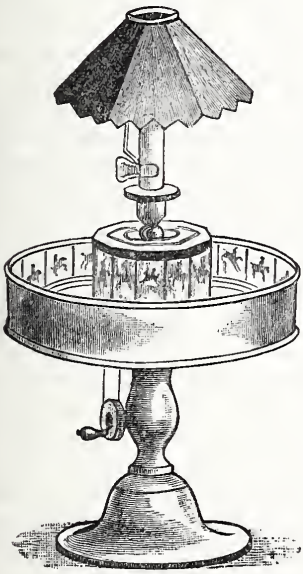


Fig. 4.

To Muybridge, Anschuetz and Marey we owe a great deal.

In Fig. 2 we have a picture of a jumping horse by Anschuetz, while Fig. 3 represents the various motions gone through in the act of making a jump over a hurdle.

Such pictures as these form an excellent study for the artist. We do not mean that the artist should copy one of these, for that would be just as erroneous. The eye never sees the horse in this position. These pictures, however, teach him what to avoid and how to best give the idea of motion.

By the use of the zoetrope (see Fig. 4) and these serial photographs realistic effects can be produced.

Walter E. Woodbury.

AMATEUR HOME PORTRAITURE.

Amateurs who have progressed beyond the elementary stage of photography, and begin to feel a desire to sound the depths of the possibilities of the art, will generally be found to bring to their work a certain amount of enthusiasm which not unfrequently leads to the development of little changes of manipulation (called "dodges") which may ultimately and occasionally be found to be useful in practice. The professional man is for the most part too busy occupied with the daily routine of his work to be able to spare much time for anything beyond the necessities of the moment; and it is only the amateur who may indulge in the luxury of trying something new, and which may, for that reason, be considered eminently desirable in theory. Not that the passion for experimenting is by any means an unmixed good when pursued too eagerly, as not a few of us have discovered to our cost. One of the drawbacks to be guarded against is the temptation to adopt the very latest form of developer, or the very newest description of printing paper, or to become entangled in the multiplicity of toning baths simple or combined.

If the truth were to be told I fear that not a few of us would have to plead guilty to the soft impeachment of having tested almost every one of the novelties that have been from time to time introduced. Speaking for myself I confess that the ingredients for trial solutions of one sort or another which I have thus accumulated would pretty well fill a respectable sized store. With age, however, we are supposed to acquire prudence, and turning over a new leaf I propose to confine myself to one fairly-well tested formula for each operation, and shall persevere to get the best possible results out of that method. There is wisdom undoubtedly in the saying that even a comparatively indifferent or imperfect law where the administration is sound and consistent, is better than a theoretically superior code loosely administered. Amateurs, too, are not unfrequently crippled for room by reason of this multiplication of formula with its corresponding variations of manipulation. This very soon degenerates into an intolerable nuisance, and the more speedily we become emancipated from such a very serious and growing trouble, the more satisfactory will be our work, and the less strain will be made on the temper.

There is another phase of the matter which is also worthy of consideration. It must be within the experience of every pho-

tographer that there are so many little (but in their results important) things essential to successful work, even when reduced to its most simple elements, that all the operator's thoughts need to be concentrated upon the special object in hand. How often have we failed to draw the slide before removing the cap of the lens, and after an elaborate calculation of the correct exposure has been made, when not a ray of light has been admitted to the virgin plate? Another and not by any means an isolated mishap is the omission to put in the stop, and the picture has consequently been taken, quite unintentionally, with a full aperture.

Let it not be supposed that it is only to amateurs that these misfortunes occur. I assisted at a meeting of the Photographic Convention of Great Britain, when a group of the members was desired and an expert professional photographer was entrusted with the necessary arrangements. In the excitement consequent upon the fulfillment of his task, two 15 x 12 plates were spoilt in succession. One resulted from the failure to protect the plate after exposure by replacing the shutter in the dark slide, a new and faulty form of spring slide having been adopted for the occasion. The second plate came to grief owing to the omission to "stop" down the lens, and the full aperture was inadvertently used, which was of course fatal to so large a group as had assembled on this special occasion.

Sometimes, however, an exposure to full aperture may be the unrehearsed cause of a good picture. For an example I may draw from my own recent experience. The subject was a forest scene with a fine old tree on the right-hand side of the view with plenty of foliage in the middle distance. The solitary figure employed was that of a man of advanced age with an open book in his hand upon which he is evidently reflecting. A well-defined path leads across the picture diagonally, which greatly assists the "composition" by counterbalancing the vertical lines of the tree and the figure. Fortunately both the figure and the tree were in the same plane and within the best part of the focus of the lens, and were therefore sufficiently defined; while the surrounding foliage, although somewhat deficient in sharpness of definition, gives quite an artistic character to the picture by throwing the important elements of the subject into good relief. The picture may in its effect be described as a compromise between extreme sharpness on the one hand and the results of "pinhole photography" on the other—extremes that ought in my opinion to be equally avoided.

It may occasionally happen that the operator in making an experiment is himself engaged as the "model" in a proposed picture, and has no one at hand to whom he could entrust the uncapping of the lens. I have recently placed myself in such a dilemma and have ventured on a way of escape but cannot yet tell how far on the road to success I may have traveled. The subject was "home portraiture" and the scene was a reception room in a private house, the walls of which were hung with pictures, many of which, being photographs, were framed and glazed. Reflection from glazed frames is well known as giving trouble. The exposure determined upon was five minutes. After everything was in readiness but the figure and the removal of the cap, I opened the lens and walked across the room and posed myself in a chair near the centre of the picture. When the proposed time had elapsed I recrossed the room and replaced the cap. The result of course will be that the figure is more or less "ghostly" owing to having received less exposure than the surroundings; but should "dodging" in the printing not give me such a result as will prove satisfactory, I shall have recourse to "combination printing" after the methods inculcated and practiced by that adept, Mr. H. P. Robinson.

I fear that I have already exceeded the limits of papers for your ANNUAL, and must therefore break somewhat abruptly the "thread of my discourse."

J. S. Hodson.

LANTERN SLIDES.

NOTWITHSTANDING all that has been written on the making of lantern slides, the excellence of the commercial slide plates, and the impetus given by the lantern-slide exchange, a very large proportion of those made in this country at least, as is evident at every exhibition, and examination of the contributions of every member of the exchange, are decidedly faulty from a technical point of view.

The most prominent fault, and, happily, the fault most easily avoided, is what is often described as "summer snowiness," a greater or less—generally greater—lack of gradations between light and dark, a state in which the only gradation is in the shadows, and in which there is no difference between the high and middle lights. In such a slide the sky, the roads, the grass, the roofs of buildings, and even the sunlit

foliage, are all represented by bare glass, conveying the impression of having been photographed while everything was covered with snow.

The tendency to this fault probably arises from the false teaching that was wont to be common, to the effect that a slide laid on a sheet of white paper should show only bare, clean glass in the sky and lights generally, instead of only in the very highest lights. The object of such teaching was to secure freedom from fog or veiling of any kind; and the fog scare has led to widespread under-exposure, not unfrequently accompanied by under-development.

A first-class slide when laid on a sheet of white paper shows bare glass only in the highest lights, and, consequently, if the *chiaroscuro* be fairly correct, it will be limited in extent, the half lights and middle tints being more or less veiled. To secure this an exposure of an extent sufficient to penetrate all but the very densest or most opaque portion of the negative must be given, as one, even but slightly shorter, will, supposing we divide the scale of gradation of the negative into five tints, light, half light, middle-tint, half dark and dark, exclude the half dark, while one still shorter will exclude, also, the middle-tint, the former shortening the scale by one, the latter by two tints, leaving only light, half light, and dark, or "summer snowiness."

It will thus be evident that the principal factor in the production of a first-class slide from a first-class negative is the exposure, and the successful slide maker will fix upon and stick to a normal developer, and vary the exposures according to the varying densities of his negatives, always remembering that, while correct exposure is to be his aim, a little over is less injurious than a little under, as, while a slight veiling may be removed by the ordinary clearing solution, or better still, by the judicious employment of Farmer's reducing solution, an absent half dark cannot be supplied.

Speaking of Farmer's solution reminds me of an application of a modication of it suggested by Mr. Carbutt, that I have found of great value in slide making. I keep on hand a saturated solution of potassium ferricyanide, a few drops of which I place in a teacup, and add water sufficient to make a dram or so of a deep straw-colored solntion. Into one end of a piece of glass tube 4 inches long and a quarter of an inch bore, is stuffed a tuft of cotton, which makes a suitable swab or rubber, by which the solution may be applied to the whole surface, or to any part of a plate.

The slide, on being removed from the fixing solution, and before washing, is carefully examined, and any veiling that may be present removed by a slight application of the swab dipped in the ferricyanide solution. Local reduction of any particular part is in this way easy, and often much improves a slide, and, where the sky of the negative has been thin enough to give a deposit in the sky, suitable gradation, and even indication of clouds are easily produced.

John Nicol, Ph.D.

A PHOTOGRAPHIC HALL.

There's nothing new under the sun—so they say, but the arrangement of the hall of a handsome house in the pine-scented paradise known as Ronkonkoma, L. I., certainly savors of novelty.

The polished hardwood floor with its covering of Turkish rugs; its magnificent tiled mantelpiece framed in glistening oak, topped by a mirror of goodly proportions, and with the usual brass accompaniments, fender, etc., are all worthy of admiration, not to speak at all of the glimpse of well-kept lawn; the picturesque well, and the row of cedars (from which the house takes its name), as seen through the doors at either end; but it is the walls which instantly rivet the attention of lovers of the beautiful. They (the walls), are decorated with photographs taken from *The Photographic Times*, about eighty-three in all. Over the mantelpiece is a line of portraits of poets, statesmen, actresses, and other celebrities who are household words. Almost immediately opposite are a series of water scenes, arranged in the form of a cross, and representing many lovely nooks by lake and fen. A little to the right are a group of photographs showing the different seasons. Here we have a clump of autumnal foliage; there a wood scene which seems a living embodiment of joyous spring; a summer scene in which flowers run riot and sunshine predominates, and a winter landscape wherein tall trees toss their gaunt arms aloft, and dead leaves strew the ground. The animal group is a very fine one, and contains the magnificent deer-hound which many of our readers will doubtless remember as having appeared in *The Times* some time since. Then there are no end of photographs which tell a silent, it is true, but very eloquent tale, as for instance "The Fish Story," which is a masterpiece

in its way; "The Christmas Stocking," a pretty and quaint conceit; "In the Land of Nod"; "Waiting"; "An Unwelcome Visitor," etc., etc.

All the photographs are framed in oak, varying from the lightest to the very darkest shade, and too much cannot be said in praise of the various novel groupings, which make a very attractive *tout ensemble*, and which is due to the truly artistic perceptions of the fair châtelaine of "The Cedars."

On a rainy day, when lake and lawn are denied to the small folk, they gather in the hall and find an ever new pleasure in studying the photographs and "making up" charming stories about them, all of which undoubtedly helps to cultivate their love for art in its highest form.

Any reader of *The Photographic Times*, wishing to beautify a hall, may do so at comparatively little expense, by saving the weekly photographs published by *The Times*, and giving full sway to their artistic tastes.

K. E. Barry.

ON INSTANTANEOUS PHOTOMICROGRAPHY.

Three methods of making instantaneous photographs of microscopic objects have been proposed by as many different authors, without referring here to that of the most primitive character, by which an instantaneous shutter is simply placed between the source of light and the object to be photographed.

The first method * consists in the most intense illumination possible of the object; sunlight being absolutely necessary; and, as practice teaches us, it must be concentrated by condensers for all, even with limited enlargements. On the other hand, there is a shutter attached to the objective which when in its first position throws, by suitably arranged reflecting prisms, the light reflected from the object to a laterally attached tube. Through this tube the living object is seen and observed, and by attentive watching the moment for the exposure selected. This moment having arrived, the prism is rapidly pushed aside; its motion is followed by a slit cut into the movable portion of the shutter, illuminating for an instant the plate inclosed in the camera, the optical axis of which corresponds with the optical axis of the main tube of the microscope. Then comes the solid part of the shutter covering up the plate

* Eder's "Jahrbuch" for 1888, p. 311.

entirely, and the exposure is made. The shutter may be in the form of a rotating disk or be a simple disk and be released by pressing the finger upon a lever or by pneumatic force.

The disadvantages of this method are, in the first place, the blinding of the eye by the highly intense light when watching for the most favorable moment when exposure is to be made, an evil easily removed by interposing colored glass screens between the object and the eye or within the observation tube; and, secondly, in the continuous exposure of the object to light, and with them to the very injurious rays of heat. The loss of light taking place simultaneously may, however, be prevented by heat-absorbing media.

The second, but recently proposed method,* is to employ a light-source, flashing up instantaneously, and of such intensity as to make photomicrographic exposure a possibility. Of such character is the magnesium flash-light usually employed in photographic practice, for interiors, portraits, etc. It is self-evident that for our purposes the magnesium compound should burn with great rapidity. The method proposed by Newcomb and, later on, by Neuhauss and others,† has been much improved by adding to the respective magnesium powders (blitz pulver) substances which render the flame greenish yellow, thus permitting one to photograph with but imperfectly corrected lenses. The objection to this method is the impossibility of selecting at will the moment of exposure.

The third method‡ is designed to do away with the imperfections of the two others, but demands for the purpose more complicated apparatus. It consists of two principal parts: The first serves to control the light and separate heat rays during the time the object is examined, and eventually to functionate as an instantaneous shutter. The second facilitates the observing of the object, and of watching for the moment when exposure is best made; the light rays are thrown into a laterally affixed tube, placed vertically upon the optical axis of the instrument, and during exposure only are permitted to follow the straight path to the plate under exposure. The first part is represented by a slide-shutter, which slide shows successively the following points:

1. A circular opening covered with colored glass or gelatine laminæ, is placed during observation between light source and

* Eder's "Jahrbuch" for 1892, p. 70.

† Eder's "Jahrbuch" for 1892, p. 70.

‡ *Wiener Photographische Correspondenzen*, 1888, pp. 182, 463.

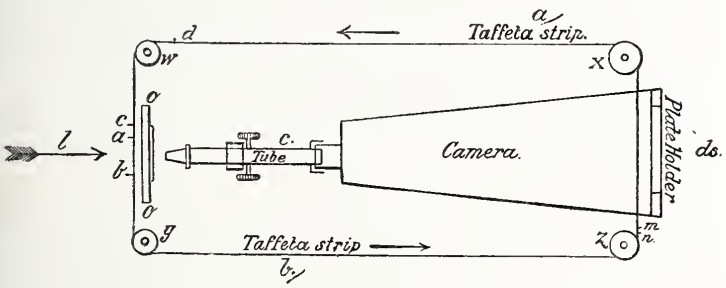
the eye. By its means light and heat rays can be lessened in force, as exigency may require.

2. A rectangular slit makes the exposure by sliding forward.

3. The non-perforated portion of the shutter excludes all light after exposure is made.

This first described part must naturally be interposed between light source and object.

The second principal part of the instrument consists also of a slide carrying a reflecting prism, by which, as above mentioned, the light rays are thrown into the laterally-attached tube. When releasing the slide, the prism is rapidly pushed aside, opening the passage for the light rays to the main tube. The prism carriage is best fastened directly behind the objective, or eventually to the end of the main tube. Both shutters must, of course, be released at exactly the same time, but by



m, n.—Slit for exposure.
a, b.—Circular aperture, covered with a red gelatine pellicle.
c, d.—Rectangular aperture, allowing light to enter during exposure.
l.—Direction of the light rays entering.
w, x, y, z.—Rollers upon which the taffeta slips are propelled.

pneumatic or electric force. The prism carriage moves then with great rapidity, the path is opened for the light rays to the sensitive plate, the slit of the first slide passes across, and the exposure is made.

By this method, described first by the author of this article, quite extensive enlargements can be made instantaneously, and without harm to the object to be photographed. The light may be stopped down considerably by means of colored glasses inserted in the first slide as well as by highly concentrated direct sunlight.

The only difficulty that can occur, and which increases pro-

portionately with the extent of the enlargement, is insufficient rapidity of the two shutters, for the greater the enlargement the more are the motions of the object to be photographed enlarged. It is difficult enough to photograph sharply the outlines of the body in question (*e. g.* infusoria, ostracodes, etc.), but when the organs of motion, as wings, feet, etc., really do move, it is next to impossible to do so.

It has been shown before now how the precision of the pictures is somewhat limited when employing the Anschuetz slit shutter, and as single portions of the object are not photographed in perfect uniformity, but only successively so, I am convinced that by our own method more perfect and sharper pictures are attainable.

It is well known Anschuetz's shutter consists of a strip of black and opaque taffeta, a trifle broader on the upper part of it than the photographic plate, having another slit crosswise. This strip is stretched immediately before the photographic plate, and excludes all light reflected from the object. That part of the strip in which the slit is cut is carried across the plate in the moment of exposure; the solid part following protects the plate from all light action.

But when employing circular strips of suitable width passing over four rollers, arrangement can be so made that the part of the strip by which instantaneous exposure is effected in the direction of the two upper rollers, light may enter through the slits into the interior of the camera, by passing the slit immediately before the plate, while the opposite part of this strip is propelled over two rollers so posted as to pass immediately before the object in similar manner as the colored glass slide shutter above described. But if we cut a circular aperture in the opposite side of the taffetta, and cut besides this a rectangular opening whose longer sides exceed in length those of the photographic plate, the slit in the upper part of the strip will pass before the plate at exactly the same time when the rectangular cut out allows light to illuminate the object. The prism arrangement remains as above described, and must be released by a device similar to the mechanism by which the propelling of the taffeta strip is effected.

The prism slide shutter is omitted for simplicity's sake, also the mechanism for turning the taffeta strips.

Gottlieb Marktanner-Turneretscher.

WHAT ARE WE DOING?

In truth we in the "little mother isle" beyond the sea have not done too much during the past year. There has been considerable photographic fuss, to say nothing of frivol, but there has ensued only a very small measure of fruition.

We have seen the introduction of loudly trumpeted improvements, but no corresponding betterment of results in the work of our practitioners.

But then, to be sure, it is not every one who wants to make his fiancée's feet look smaller than life, nor do most of us wish to undertake a railway journey in order to set up our camera to photograph the summer-house in our back garden; neither do people very much care for the power afforded them of grossly over-exposing their negatives.

So much for improvements which we have got but could very well do without.

What we all yearn for but cannot get hold of is the projected hand-camera.

It seems more than passing strange, considering the fortune which awaits the inventor, but is none the less "ower true," that, anyhow over here, an instrument including all the fundamentals of a good hand-camera is a thing of the future.

Of course I am quite aware that on the British market there are at the present moment a score or more of various patterns, any single one of which will, in capable hands, with the exercise of due care, and under suitable conditions of light and subject, turn out very serviceable, even satisfactory, negatives; indeed, at times they yield exceedingly splendid results. But the fact remains that a simple, widely and unfailingly efficient, durable, high-class instrument, which is not costly, cannot be got.

There are without doubt plenty of simple hand-cameras, but probably none so simple as those who buy them; there are also several makes which are efficient enough in the restricted sense that their various powers and adjustments are both comprehensive and in their way effective; but in all cases these last have the fatal blemish of never being ready for action until quite a number of worrying and fallible adjustments have been made.

Durability and high class are not quite synonymous, although the latter quality ought to include the former.

It must be admitted that these last two desiderata are occasionally wanting in cases where one would not suspect it;

due, no doubt, in some considerable degree to the pressure which is at times put upon makers to effect the quick delivery of goods which should only be constructed with extreme deliberation, and with a firm insistence on the part of all concerned to freely sacrifice time in order that each and every instrument should in all ways be as perfect as the model upon which it is made.

Respecting cheapness, there are on sale several forms of the magazine type at three dollars each! Cheap as these are, it is cheaper still to do without them.

In conclusion, the most serious defect which still disfigures the magazine type is "Jam," while the dark-slide hand-camera is usually troubled by the demon "Fog."

Hector Maclean, F.G.S.

TENTATIVE DEVELOPMENT ON A LARGE SCALE.

I do not know with what sentiments most people approach the task of developing a large number of exposed plates or films, but to me there is no more pleasant prospect than that of developing a number of exposures, where my conscience tells me that there is at least a chance of every exposure being approximately correct. And the pleasure is enhanced when the subjects have been of diverse kinds and picturesque withal. If one were *certain* that every exposure had been *nearly* correct, the pleasure would be lessened; if one were quite certain that no mistake had been made, it would be annihilated. Now and again when I have heard of some new exposure-meter coming out I have had fear that much of the life was going to be knocked out of my photography, but up to date I have not found any such instrument that would in the slightest degree imperil my pleasure or interest, simply because no one of these instruments helps me in the least at the times when I feel that I require some guide to the proper exposure. Such meters as we have in this country at least are very clever at telling us the exposure when we know our plates and our stops, and when we have a calendar and a watch in going trim; also when we are dealing with a scene that can be described in a few words, as "Open Landscape," "Portrait in Open Air," and so on. But in five minutes any one can learn all this for himself; if we once settle on a brand

of plates and confine ourselves to a couple of stops—say, *f*/16 and *f*/32—and if we make up our mind what we mean by an "open landscape," a "dark interior," "dull light," and so on, a very little experience will tell us all that the meters tell us. But when we get to a subject which we cannot describe in the cabalistic words of the meters—that is to say, whenever any real difficulty arises—then the pocket frauds are found wanting. Take an interior or a deep glen, how are we to say whether it is "fairly lighted," "dark," or "very dark," and what allowance are we to make for colored windows, or foliage, or rosy sunset skies? Any fool can in a short time master the plain sailing, but to master the real storm a meter is no help—thank Heaven!

Lately I had a great many negatives to develop—hundreds; some on plates, most on experimental batches of rollable film; the exposures were mostly "snaps," but of these the subjects were very various, some wide open and distant views, groups in streets and market-places, groups by the sea, shipping, architecture near and distant; some few were pure landscape with foliage, which after such a dry summer is no joke. (By the way, the meters take no account of rain or drought, a most important item.) And I had kept no notes of what subjects were to be found on what plates or films. All these were to be developed, and in a short time, for other work was pressing. As the results were in almost every case technically good so far as the chemistry of development goes, it may be of interest to some readers if I relate the method I followed in the development of so many and so various exposures.

There are some who would say that if the results were good it was simply because the exposure had been well judged; but it so happens that my shutter had got out of order and I could not give any but one exposure, and that the fastest—perhaps one-thirtieth of a second, and this had to answer for all the subjects stated above. Except for the wide distant views, which were merely "topographical," I used one stop only, *f*/8; and there were some exposures in a deep wooded glen which, as I was out of practice, puzzled me much; and these last are my poorest negatives, being somewhat thin from over-exposure. I may therefore safely say that one speed of shutter could not give the "correct" exposure for sea-pieces, harbor-views, streets mostly narrow and dark, groups, etc., and my system of development must have had something to do with my successful results. Further, the majority of the negatives were developed with alkaline Metol-Hauff, over

which I have not yet gained as much control as I have, from long experience, over pyrogallol. I may say, however, in passing, that from these and other experiments I believe that metol will be found to be as "elastic" as any other developing agent when we come to understand it properly. The plates were the extremely rapid "Lightnings" of Cadett and Neall, and I found that with all the open views, and all the shipping and groups by the sea, there was a distinct evidence of over-exposure; the films were Eastman's, of eight or nine different batches chosen for trial, and these also were fully exposed for the better lighted subjects. Four plates were, as a rule, developed at one time in one dish; and in nearly all cases twelve films were treated simultaneously in one dish, or at least started in one dish.

I began operations with metol, my standard being the formula given by myself to Messrs. Fuerst, the British agents for the maker.

A.

Metol-Hauff.....	1 part or 50 grains	About 1 per cent. metol.
dissolved in water.....	100 parts or 10 ounces	
Add sodium sulphite....	10 parts or 1 ounce	

B.

Potass. carbonate.....	1 part or 1 ounce	10 per cent.
Water to..... ...	10 parts or 10 ounces	

C.

Potass. bromide.....	1 part or 1 ounce	10 per cent.
Water to.....	10 parts or 10 ounces	

The developer of normal exposures to consist of 3 parts of A to 1 part of B, to each ounce of which may, as a rule, be added 10 minims of C.

Later, having satisfied myself of the applicability of metol to such work, I took to an Eastman formula, pyro and carbonates.

PYROGALLOL SOLUTION.

Sod. sulphite.....	6 ounces
Hot water.....	32 ounces

Cool, and add pyro 1 ounce and citric acid ½ ounce.

POTASH AND SODA SOLUTION.

Sod. carbonate crystals.....	3 ounces
Pot. carbonate.....	1 ounce
Water.....	32 ounces

The developer consists of 1 part of pryo. solution, 1 part of

carbonate solution, and 2 parts water. The ounces of solids are avoirdupois. These may be called my standard developing solutions; modifications of them were used as follows:

Metol Developer.—Three solutions were made up as follows: 1. The metol solution above formulated, but with only a small proportion of the alkaline solution,—about 1 drachm of the potass. carbonate solution to the ounce of metol solution,—and 1 grain of bromide to the ounce of developer. 2. The standard solution given above with 1 grain of bromide to the ounce. 3. The standard solution without any bromide.

Pyro-soda Developer.—1. Pyro. solution as above, 1 part; soda solution, 1 part; water, 6 parts; bromide, half a grain to the ounce of developer. 2. The standard developer, but with 1 grain of bromide to the ounce. 3. The same without bromide.

In both cases, then, we have three developers of strength increasing from No. 1 to No. 3; and after soaking the films I placed 10 or 12 in No. 1, and waited till the image was so far developed that I could tell what the subject was. This was really all I required to discover, for I knew with that a few exceptions my exposures were in no case seriously overdone, and I also knew that the exposures were of the same duration for all the subjects, by the way, in which the images appeared in No. 1,—by the general appearance as well by the time taken to appear,—a very fair idea could be got as to the suitability of the exposure to the subject; but in almost all cases when I saw a film to represent an open view, or a sea-piece, I left it some time longer in No. 1, and usually finished it in No. 2, but soon as I saw the subject to be a street view, or boats with dark sails, or a close group, I gave it a touch of No. 2, and finished in No. 3. Some instances occurred where it was at once seen that exposure was "under" rather than "over"; in these cases the film would be transferred at once from No. 1 to No. 3. I was taken by surprise in coming upon the time exposures of the glen, and in fact some of these were allowed to beat me; but when I took warning and had ready a developer containing extra bromide, and in some cases a citrate, good negatives were obtained, though I do not hesitate to say the films were four or five times over-exposed.

The use of the citrates as restrainers in development was first suggested, if I remember aright, many years ago by Mr. Watmough Webster, and has been adopted by several workers, *inter alios* Mr. B. J. Edwards and myself. As it is of great service with the more modern developers, such as metol and

amidol, it may be well to say that the citrate of soda or potash may be made up in 10 per cent. solution and kept for a considerable time, the fungus that will form in it doing no harm in practice. If we find a plate over-exposed to such an extent that the image rushes up and refuses to take density, the plan is to add to the developer a quantity of the citrate, 20 to 60 minims of the solution to each ounce of amidol or metol solution. Some writers seem to hold the opinion that the citrate acts *per se* as an intensifier; this is doubtful, but at any rate the citrates stop the appearance of fog until the image has gained density. I endeavor to put the plate into the developer with citrate as soon as all the detail shows on the plate. I must say that I suspect that the citrates actual confer density, as well as merely stopping fog till the active parts of the developer produce the density; but the matter requires methodical investigation. Anyhow, these salts are very useful in this capacity.

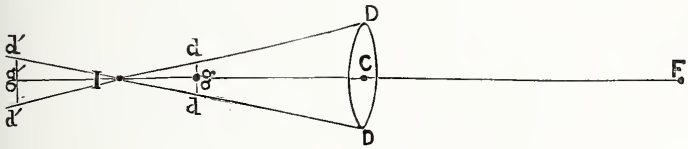
I do not claim that there is any novelty in the above system of treating a large number of miscellaneous exposures; similar methods are used, no doubt, in many establishments where similarly tentative development is required. My point rather is that under the chief difficulty of having but one duration of exposure for very various subjects, I should have saved very nearly every exposed plate and film; for out of about 200 exposures I lost not more than two or three from errors of exposure and development, not counting those in the glen, which I might have saved if I had at first taken the bull by the horns. And further, I got through a lot of work in the time; I developed 6 spools of 24 exposures in 5 hours one day; one of these gave me the best 22 consecutive negatives I ever remember to have developed. In common with many true amateurs I might have preferred to develop one at a time, gloating the while, but other matters pressed and I had to hurry up. Briefly put, my system may be described as follows: The exposures being all alike, I suited my development to my subject.

Andrew Pringle

NOTES ON CAMERAS WITH FIXED FOCUS.

Many cameras are constructed having a fixed focus. The following discussion is chiefly to indicate the manner to use the lens to the best advantage:

It is generally admitted that a blur of $\frac{1}{100}$ of an inch is permissible. On this assumption, if the ground glass is focused on an object "CF" distant, it will form the image at "I," the place of the ground glass.



If "dd and d'd'" are only $\frac{1}{100}$ of an inch everything forming an image between "g' and g" will be in focus; hence, if we find "gI and g'I" we can calculate the nearest point an object will be in focus when the farthest point is in focus at "g." The latter refers evidently to the equivalent focus of the lens. From the above figure it will also be seen that the smaller "DD" (*i.e.* the available aperture of the lens) becomes the smaller; "dd" will be and "Ig" can be increased, giving greater depth of focus.

The proportion DD:dd=IC:Ig will give us the value of "Ig" viz: $Ig = \frac{IC}{DD} \times dd$. As $dd = \frac{1}{100}$ inch, IC = equivalent focus; DD = aperture of lens.

This formula gives "$Ig = \frac{\text{Eq. Focus}}{\text{Aperture}} \times \frac{1}{100}$" (all measurements in inches).

From this value of "Ig" we can calculate "CF" the distance of the object found by the formula $\frac{1}{CI} = \frac{1}{CF} + \frac{1}{Cg}$.

If we now focus on an object which is at such a distance that the $\frac{1}{100}$ inch blur of another object at infinite distance will fall at "g," we shall be able to calculate the nearest object which will form an image with $\frac{1}{100}$ inch blur at "g'," and from this latter object, as the nearest point, everything beyond will be in focus.

The subjoined table gives the focus point (*i.e.*, the point the lens should be focused on), and the nearest point beyond which everything is in focus for different lenses and apertures.

Ratio of Aperture to Focus.	Equivalent Focus of Lenses.						
	2 inch.	3 inch.	4 inch.	5 inch.	6 inch.	6¼ inch.	9½ inch.
	N.P. F.P. Feet. Feet.	N.P. F.P. Feet. Feet.	N.P. F.P. Feet. Feet.	N.P. F.P. Feet. Feet.	N.P. F.P. Feet. Feet.	N.P. F.P. Feet. Feet.	N.P. F.P. Feet. Feet.
f/ 4.....	4⅓–8½	9⅔–19	17 –33½	26½–52½	38 –75½	48½–96	94 –188
f/ 5.6....	3 –6	7 –14	12 –24	19 –37¾	27¼–54	35 –69	67 –134
f/ 8	2¼–4⅓	5 – 9½	9 –17	13½–26½	19¼–38	24¼–48	47 – 94
f/11.3....	1½–3	3½– 6¾	6⅓–12	9½–18¾	13⅔–27	17 –34	33 – 66
f/16.	1⅛–2⅙	2½– 4¾	4½– 8½	6¾–13¼	9¾–19	12 –24	23½– 47

If we calculate the nearest point and focus point of any lens for a fixed ratio (suppose *f*/8), the above points can easily be found for any other ratio by dividing the new ratio for which nearest point and focus point are required by the old ratio for which the values have been calculated (in the supposed case by 8), and with this quotient we divide the values of nearest point and focus point found (*i.e.*, those for the ratio of *f*/8 in supposed case), and the result will be the nearest point and focus point required.

The above calculation is not strictly correct, as we assume equivalent focus and conjugate focus of nearest point to be equal, but practically the error can be neglected and does not give any appreciable difference in the results.

Col. A. Heger.

WANTED—A PHOTOGRAPHIC REFERENCE LIBRARY.

The claim of photographic literature to consideration is recognized to-day to some extent, but by no means as widely and as fully as it *might*, not to say *should* be. Considerable progress has been made in various quarters, but mainly among the leading societies, in getting together collections of books on the subject. Among them may be mentioned the "Photographic Society of Great Britain," which has recently (July,

1893) issued a catalogue of its library, which it is taking active steps to increase.

The Camera Club (London) has also a catalogue of its large collection, issued some two or three years since. In this country, the Boston Camera Club and the Photographic Society of Philadelphia have made good beginnings of collections, and the publishers of *The Photographic Times* have issued, as a supplement to that journal, a list of their books, which have been gradually accumulating.

Nevertheless, it still remains true that there is not, in this country, any collection which can be reasonably called complete. The Patent Office Library in Washington has sets of the leading journals, and a number of titles of single books, not all of which, however, can be produced when called for. The Boston Public Library has a set of the *Photographic News*, but only a partial set of the *British Journal*. The Columbia College Library, in New York, has a department, where most of the recent works may be found; but the Astor Library has but a meagre array. These, with perhaps half a dozen private collections are the extent at present.

Considering the liability to accident by fire or flood of many, if not *most* of the collections, it seems high time that a special effort should be begun to make at some central point as complete and representative a collection as is now possible. This might be done under the auspices of some society, or some library might make a feature of it. But the first step is to get individuals to recognize the desirability of such action —the result will then certainly follow.

C. W. Canfield.

A LESSON IN BACTERIOLOGY.

The study of microbic life is of transcendent interest and importance above all other branches of biology, and I write these lines hoping to encourage some photographer to venture into this new world, to which, I shamefully confess, more than half of our American physicians are still strangers.

Bacteriology offers great advantages; it can be studied with inexpensive apparatus, and in narrow quarters; some of the best work of our great expert, the Surgeon-General of the Army, was done in his own hired house, and with no laboratory facilities.

Microbes are so small that a good microscope *is* an essential,

but these are common enough and cheap enough, nowadays. This should have two eye-pieces; a half-inch or two-thirds-inch objective as a low power; with at least a one-tenth (or one-twelfth) lens of good quality; preferably an homogeneous, or oil, immersion, as every ray of light is essential; a first-class water-immersion will do, however, with some loss of light and definition.

The usual "slides" for mounting objects, 3 inches by 1 inch, with three covers, the "No. 1" covers of catalogues; a spirit-lamp, dissecting-needles, and a bottle of balsam in xylol for mounting, though damar can be used, if preferred; as "staining fluids," basic anilin dyes are used, of which a few grammes each of fuchsin, methyl-blue and gentian-violet will suffice. The only reliable dyes are those of Dr. Gruebler, imported by Meyrowitz, the optician of 23d Street, New York.

I have space only to speak of two microbes, the bacilli, and cause of tuberculosis, and croupous pneumonia, though many others are interesting; these, however, are easily obtained and stained, and a photograph would be highly appreciated by any medical friend.

Let us first prepare our general staining fluids, first the "carbol fuchsin," or "Ziehl-Neelsen," as we call it in the laboratory.

Take basic fuchsin 1 part by weight, strong alcohol 10 parts, and 100 parts of a 5 per cent. watery solution of carbolic acid. Mix well, filter and keep well corked. This is a very useful stain that keeps well—some say "the older the better."

The "Loeffler" methyl-blue, our counter-stain, is made by adding 3 parts of a saturated alcoholic solution of the methyl-blue to 10 parts of a solution of caustic potassa in water of a strength of 1 to 10,000, or 1 decigramme to the liter. This stain is not very permanent, but kept cool and in the dark, it will not need frequent replacing.

The "bleaching fluid" is made by diluting one part of nitric acid with enough water to make 4 parts, and is therefore a 25 per cent. solution.

Staining the Bacillus Tuberculosis.—Great interest naturally attaches to this, the greatest scourge of the human race. The bacillus can be found in immense quantities in tuberculous lungs, and other organs, the milk of tuberculous cows, etc., and especially in the expectoration of cases where the lungs are breaking down into cavities, especially in the very rapid form called "galloping consumption," where sometimes less than 8 to 10 weeks elapse between perfect health and the coffin.

eo. M. Weister, Photo. W. Kurtz, Engraver.

MOUNT HOOD.

To secure a specimen of sputum, a wide-mouth bottle is useful, like those for vaseline, the expectorated matter coughed up in the morning being preferable.

After being at rest a while, we shall see that the upper layer of sputum is frothy, light, and liquid; this comes from the mouth, the nares, and the bronchi, and is to be carefully poured away into another vessel. The lower layer is thicker, and may best be examined by laying a pane of glass upon a dark surface, the sputum being carefully poured upon the glass.

Careful inspection will show us here and there grayish-yellow, translucent particles the size of a pin's head, or larger, which we shall probably find abundantly stored with the desired microbe.

Having cleaned a few covers, pick up one of these gelatinous masses by means of a bent needle, and place it on the center of a clean cover; then gently lay over it another clean cover, and press the glasses together until the mass has spread out to the cover's edge. Still keeping up gentle pressure, slide the covers apart, edgewise, and lay them carefully aside, films up, so that we now have an extremely thin layer of tuberculous matter evenly spread over both covers.

Now light our spirit lamp with a small flame, take up a cover in our light forceps, and gently dry the film, too high up to burn it, until we see it evenly dull and dry; this done, pass the cover deliberately three times through the flame.

This is "fixing"; it coagulates the albumin and prevents the film washing off during subsequent operations. Both covers being thus treated, we are ready to stain the films which they support.

Hold the cover, film side up, in delicate forceps; pour upon it a few drops of the "Carbol-Fuchsin," enough to cover it entirely, and gently heat at the spirit lamp until the staining fluid begins to give off steam freely, when the residue can be drained away and the cover washed by agitation in water. Next, dip the stained cover into your dilute nitric acid, for a second or two only, rinsing it instanter when you see the color all bleached out, and, after thorough washing, rear it up on its edge upon filter paper to drain and dry until its fellow is also ready, when the "counter-stain" may be applied by putting a few drops of the methyl-blue fluid upon the film for half a minute or less, then rinsing and draining as before.

Both covers being now done, they are ready to mount permanently and examine.

When the covers are perfectly dry, which can be done by careful heating over the flame, clean some slides and place upon one of them a drop of xylol balsam. Gently lay down the dry and warm cover upon the balsam (film down, of course); when the slide is finished so far as immediate examination is concerned, though displacement of the cover is easily done until the balsam hardens, which is an affair of some weeks in a warm, dry place.

On looking at our specimens with a high-power lens we shall find an immense number and variety of cells, all with bright blue nuclei, being mostly pus cells and leucocytes; innumerable strings and groups of round bead-like blue bodies, which are the "cocci" of suppuration. Other strings may be seen of blue, rod-shaped bodies, often end to end like beads and of many parallel rows;—these are bacilli. One slide often contains enough varieties to fill a whole evening with study.

These, however beautiful, are the unimportant forms; but if tuberculosis be present we may expect to find here and there, often in little bunches of three to a dozen, very slender rod-shaped bodies, sometimes several in a row, much slenderer than any other bacilli present; though very delicate, yet very conspicuous on careful study, because they alone are stained a brilliant scarlet, all else being blue. These objects are the dreadful "bacillus tuberculosis," which are never found except in tuberculous individuals. In very early phthisis and in the "old-fashioned" consumption, where people sometimes have phthisis forty or fifty years, the bacilli are often scarce, and we have learned that the rapidity of any case is almost always directly proportionate to the bacilli found in the sputum. In tuberculous cows the bacilli are often abundant in the milk, and the unfortunate children fed thereon develop "marasmus," or tuberculosis of the bowels, not of the lungs.

Label your slides before laying aside in a dry and dark place, as sunlight often fades out these alilin dyes. I have some stained six or eight years and yet in good condition.

Never forget that tuberculous sputum is dangerous stuff to be careless with; therefore, destroy by fire all residue unused, cleanse all vessels well with hot water, and use carbolic acid 5 to 10 per cent. solution in water for the hands and instruments.

Pneumonia.—Spread out as before a particle of the sticky sputum of pneumonia upon your cover glasses. When dried and fixed it may be stained in carbol fuchsin for a few seconds in the cold, well washed and dried. After mounting in

balsam, an immense variety of microbes may be seen, but the essential one is a very short oval bacillus, usually in pairs end to end, sometimes in short filaments. These are the "diplococcus lancsolatus" or "pneumo coccus," as originally named, and are the cause of the disease.

If a drop or two of such sputum is injected under a rabbit's skin he dies of rapid septicæmia or blood poison in a few days, his blood swarming with untold billions of this "pneumobacillus," but he will show *no* pneumonia; but, if you eject this sputum from an atomizer and allow him to breathe it, your rabbit will die quickly with classical "croupous pneumonia!" Let me merely say that both specimens will photograph well with an oil lamp, and that anyone having access to a good microscope can obtain specimens from their medical friends, who will feel more than requited by a nice print of either microbe. Those who wish to know more of this wonderful subject can send to W. B. Saunders, 913 Walnut Street, Philadelphia, for a copy of his "Essentials of Bacteriology" ($1), which is well illustrated and amply worth its cost to all who desire more knowledge upon this wonderful subject, which is the fairy key by which we are to unlock the secrets of the causation and prophylaxis of epidemic disease.

Nelson B. Sizer, M.D.

NOTES ON PHOTOGRAPHY IN BOSTON IN 1839–40.

Some time ago I cut from a newspaper a stray paragraph stating that "Rev. E. E. Hale, of Boston, claims to have made some of the earliest photographic experiments in this country, while a student at Harvard College." I thereupon wrote to Dr. Hale, asking him for particulars, which he very kindly gave me (with permission to use them), as follows:

"I do not remember, but I think the scrap must have been taken from an article I wrote for the *Forum*, on my college life.

No matter where it came from, the exact facts are these: We were all interested in the daguerreotype; and Talbot, the Englishman, rather annoyed that he lost the credit of the discovery, published in some English scientific journal, in March, 1839, his processes on paper. We used to call them Talbotypes. Mr. Samuel Longfellow, who has just now died, and I, were intimate friends, in Massachusetts Hall in Cambridge. We had the nitrate of silver of commerce,—poor stuff it was,—and followed Talbot's directions as closely as possible. With these direc-

tions, and with an artist's camera, which I have still, I took a picture of the windows opposite, in Harvard Hall. In especial, there was a bust of Apollo in the window, which came out very well, black on white ground, the bust being itself white on the black of the room beyond. I thought at the time, and I think now, that this was the first experiment in a Talbotype which was made in this country.

In December, 1839, or in that winter, Gouraud arrived in this country as Daguerre's agent. He had a good many of Daguerre's pictures. He had a class in Boston, to train amateurs and connoisseurs in making daguerreotypes; and to this class I belonged. With my cousin, Francis Durivage, I made a daguerreotype apparatus. At that time portraits had not been attempted, at least with any success, and I have always supposed that a portrait of myself, which, with my cousin's assistance, I took in the spring of 1840, was the first daguerreotype portrait taken in Boston. But I never verified this, and I am very sorry to say that I have not that picture now. The exposure of the portrait which I took of myself was five minutes, and I held a looking-glass in my hand, to take out the shadows under the nose and eyebrows.

I found out afterward that our difficulty was in our buying the nitrate of silver which apothecaries then sold merely for its use in the treatment of throats, which had already lost most of the properties for which we wanted it. So soon as we learned this, and made our own nitrate of silver, of course we did better.

I do not find the date of the picture of the head of Apollo and Harvard Hall, which picture is long since lost. I think it must have been in May, 1839; certainly it was before the middle of June in that year.

I have had these copies made from an old journal. They will give the Gouraud dates—and are a little amusing, I think, as showing the detail.

THURSDAY, March 26, 1840.—School till 1¼. Thence to Mr. Gouraud's. Thence to a thermometer maker. Neither of them were in.

SATURDAY, March 28.—Just after dinner I carried a proof of the "Chronicle" to Dickinson, and about 4½ o'clock I walked up to Aunt Lucy's to see the daguerreotype, which is now almost done.

TUESDAY, March 31.—Clear, cool and windy. School till 1. After I got home I had a little pretty successful photoging. Made a pretty successful glass etching of a map of Nahant, which illustrated quite to my satisfaction the applicability of photography to map printing.

WEDNESDAY, April 1.—On my way home I stopped at the shop and got my daguerreotype thermometer; there seems to be a great demand; there were three or four others there.

SATURDAY, April 1.—After school I made one or two purchases preparatory to distilling some water for the daguerreotype.

[We had to distil our own water—because the Boston water of that day was so impure.]

WEDNESDAY, April 15, 1840.—Cloudy in morning, clear in aft. Mild. After school I went to Mr. Gouraud's and got a daguerreotype plate to experiment upon. Carried it up to Francis's, and having gone through the preparatory processes, took a view of Mr. Mott's church from the corner of their street, with which I was highly delighted. It had several defects, but was nevertheless admirable. I stood in the picture myself, getting Francis to open and close the camera at the right time. But this operation was rather a failure, for having stood mostly against a strong, dark shade, nothing but my white shirt bosom and face and my two legs, which came against a light in the picture. It seemed really more wonderful than ever to think that the picture took itself so entirely that I, who was the artist if any one was, was represented (and correctly) in the drawing.

I dined at Aunt Lucy's. After dinner carried my drawing, or rather picture, to the State House to show to Francis's coadjutors there."

In this connection it may be interesting to quote the title of a pamphlet (16 pp., 8vo.), in the Boston Public Library, as follows:

"Description of the Daguerreotype Process; or, a Summary of M. Gouraud's Public Lectures, according to the Principles of M. Daguerre, with description of a Provisory Method for taking Human Portraits.—Boston: Dutton & Wentworth's Print, 1840."

So far as my knowledge goes, this is the first separate publication devoted to the subject issued in this country Translations of Daguerre's own book appeared in several monthly magazines early in 1840 (one in October, 1839), but I know of none issued especially.

C. W. Canfield.

A RECORD OF PHOTOGRAPHIC PROGRESS.

Introduction.—Although in the year that has passed since the last issue of The American Annual of Photography, and Photographic Times Almanac, no striking discoveries or inventions have been recorded, yet there has been a decided advancement in many branches, and a number of improvements made on various processes and apparatus. In these pages will be found probably as complete a record of photographic progress during the year as it is possible to get together, while *The Photographic Times* will keep our readers acquainted with everything of interest that takes place. In passing, we may state that this magazine has of late been very much improved. The number of pages of reading matter is now increased from twelve to sixteen, and the magazine embellished with a number of high-class half-tone blocks and illustrations, besides the beautiful frontispiece presented with each issue. *The Photographic Times* is now far ahead and away from all other papers of a similar nature.

Photographic Objectives.—Goerz, of Berlin, has invented a new lens, which he calls the Double Anastigmat, to denote that both of the optical systems are anastigmatic. In the Zeiss anastigmats the one corrects the other. The double anastigmatic lens contains two combinations, each composed of a flint lens composed in two crown ones. One of the crowns possesses a higher refractive index than the middle flint, the other has a lower index of refraction to prevent spherical aberration. These

lenses are well corrected spherically, both for axial and lateral rays, and give no astigmatic coma. The three kinds of glass used in their construction are permanent and very transparent. They are made in two series. Series III., which works at *f*/7.7, and series IV., with largest stop, *f*/11. These lenses give wonderful definition, with larger stop, embrace an angle of 70 deg. and 90 deg. and can be used with the highest-speed shutters.

Rodenstock, of Munich, constructs a lens named by him Bistigmat, with lenses not constructed for coincident foci. After finding the optical focus, the lens is pushed into the chemical, and exposure is then made. Notwithstanding the anomaly in the construction and correcting of lenses here displayed, the Bistigmat is a very grand objective, has a wide field of vision, works sharply, and does good work in reproductive photography.

Single achromatic lenses of 36 inches focus and 3 inches aperture, intended for Hackh's naturalistic photographs, have been constructed by E. Suter. They are used for portraits in life size by instantaneous exposure in diffused daylight with that of burning magnesium.

Telephotography has made considerable strides of late by the introduction of several new lenses for this purpose. The Parvin telephotographic lens, invented by a Philadelphian, differs somewhat from its German and English prototypes. It permits of very short exposures being made and gives great depth of focus and absolute rectilinearity.

Photographic Apparatus, Etc.—With regard to these, we may state that there has been a steady, progressive movement, many improvements having been made in dark slides, printing frames, tripods, etc. We must, however, draw particular attention to the improvements made in the Henry Clay camera, which has been adapted for pictures of various popular dimensions as well as for stereoscopic work. Greatly improved objectives and more perfect shutters are now attached. Some idea of their perfection can be obtained from the reproductions in this volume taken from photographs made with a Henry Clay.

The attention of photographers has, however, been particularly attracted by the improved panoramic camera, made after the imperfect design of Commander Moëssard. The Scovill & Adams Co. are now making improved cameras of this description in various dimensions up to the enormous size of 18 x 48 inches.

A new design of constructing these cameras in hemispherical form has been invented; a new movement of crossing the objective over the segments of the circle and an automatic release for the shutter has been constructed.

The sensitive films to be exposed in these cameras are Carbutt's No. 27, or his orthochromatic of the same sensitiveness, and are inserted in an ingeniously constructed flexible dark slide, which permits of the necessary curve or rotundity of the back of the camera.

These instruments are solidly and serviceably made, neat

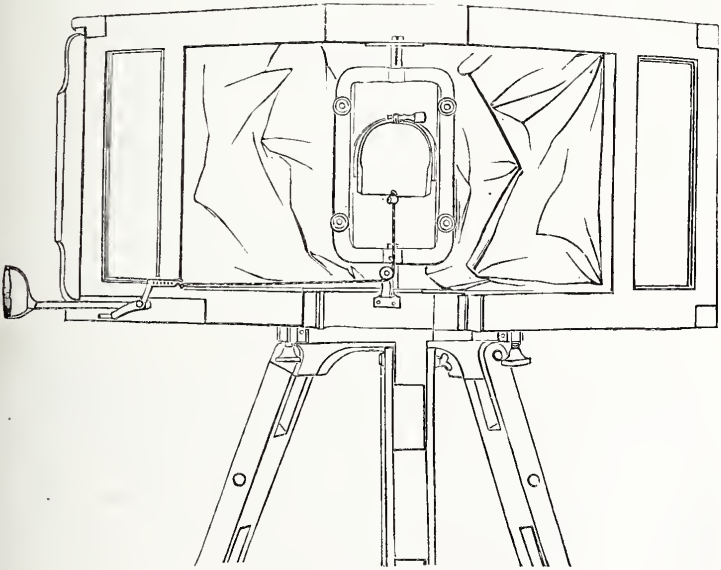


Fig. 1.

and of elegant finish, coinciding with the world-wide reputation of The American Optical Co.

In the manufacturing of plates many advances have been recorded, new coating machines have been constructed by Dr. Smith and J. Gaedicke, of Berlin.

Photography in natural colors has not only engaged the minds of professional and amateur photographers ever since the art of making pictures by the aid of the action of light and by chemical or physical processes became known, but is

yet the *beau-ideal*, to attain which so many men have striven. Still, what has been so long expected is as far off as when the first experiments in color photography were made. The general public has become interested in the matter, and when apparently a slight advance has been made toward the solving of the problem, sensational newspapers in Europe and in America announce "Eureka!" with clarion voice.

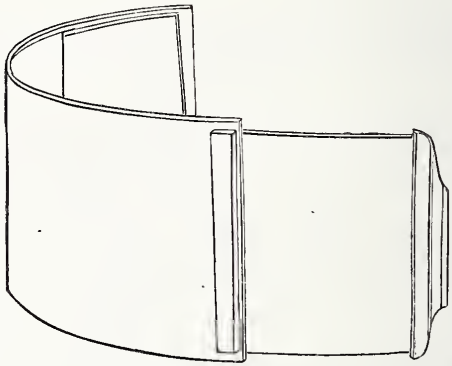


FIG. 2.

HERESZIE's results, the outcome of diligent study and serious thought, were soon considered fallacious, notwithstanding the indorsements of high authority in matters photographic. Gabriel Lippman's modifications of his spectrum photographs, particularly the application of the method to natural subjects, has not met with signal success. Generally speaking, photography in natural color stands about upon the same point Bequerell, Poitevin and Ducos du Houron left it many, many years ago. It is true Dr. Raphael Kopp, of Lucerne, was enabled to produce upon paper the colors of nature and could fix them, but his ingenious invention has never been published, and after the premature death of the talented young man, went with him to the grave.

KRONE, of Dresden, has been very fortunate in the reproduction of colors, but his spectrum photographs present peculiar phenomena, leading almost to doubt the adopted explanation of chemical facts and optical laws.

The Lumières and Valenta have described methods of reproducing colors; their experiments, yet in incipient state, encourage hope.

Of most importance are the successes Fred. E. Ives has scored, whose theory of three-color superposition obviates the enormous difficulty of printing pigments of correct tones one upon the other. He superposes colored light rays by means of the projection apparatus with the result of correct color combination, or action upon each other. In pigment printing the effect must naturally be quite different from Ives's projective pictures. He projects with light rays of the fundamental colors, while the printer selects pigments but rarely of true tone.

The prophetic dreams of Ducos du Houron appear to be nearer realization now than ever before, and although natural-color printing, the nearest approach to photographing in natural colors, is still in its infancy, the wonderful progresses made in this art lead to most audacious expectations. While many European savants and printers have repeatedly announced heliochromic printing to be an accomplished fact, without, however, showing proof of actual work, an American citizen, William Kurtz, announced his marvelous success by large editions of color prints made upon the ordinary type press. Kurtz follows in a great measure the principles of Du Houron —eliminates all color from the object to be reproduced, with the exception of that particularly wanted for one of the three negatives, etches them upon zinc, copper or brass, and then prints color upon color with the desired effect.

His heliochromic high relief pictures have won the admiration of the photo-chemist, the artist and the commercial man alike, for the Kurtz color prints are of artistic merit, the outcome of much knowledge, and he prints rapidly and cheaply.

The efforts of Ed. Bierstadt should not be overlooked here. His process of printing is that upon the lithographic press; he works with sensitizers similar to those of Kurtz, and eliminates colors from single negatives in the same manner, but to the three colors he apparently adds a neutral tint to give peculiar and pleasing effect to the total. The greatest difficulty in these and similar processes is the selection of correct and truly effective pigments in color printing. Vogel insists that the pigment must be spectroscopically like the sensitizer, or nearly so. In practice, it is impossible to do so, and Joseph Albert, the father of color printing, found great disappointment in these facts, for his color prints were highly satisfactory till compared with the originals copied from.

Whether or not Carey Lea's fruitful experiments on the allotropic condition of silver, that is when in peculiar molecular

state, will aid or assist in solving the great problem is at present impossible to say.

Orthochromatic Photography.—N. Scheurich and Dennutjapp propose new methods of color sensitizing the plate and Leon Vidal substitutes the yellow color screen by yellow dyed emulsions. But the greatest sensation of the year is the non-halation plate first made by Thomas, of London, and advertised as the "Sandell" plate.

These plates coated with two and three emulsions of different sensitiveness, first claim a total absence of halation, when halation will occur under ordinary circumstances, and, further, the almost impossibility of over-exposing them. If the upper stratum of highly sensitive emulsions has been over-exposed, the lower of but medium, or very low sensitiveness will develop simultaneously, and owing to the upper stratum, but slowly and with comparatively higher intensity, thus compensating for the flatness and the feebleness of the upper, while the thickness of the three combined films prevents the reflection of rays from the glass and annihilates halation.

Americans always on the alert soon found the means of improving on Thomas's method, and E. Wuestner made non-halation plates with a substratum of slow orthochromatic emulsion, and of extremely fine quality.

New Developers.—The looming up of new developing agents on the photographic horizon seems never to come to an end. The photographic public is much indebted to Dr. M. Andresen and to the brothers Lumière for introducing these novelties. They were not found by accident in course of experiment, but are the result of scientific calculations, derivation of chemical formulas already known. Of the most recent of these results we will mention diamidophenol, commonly known as amidol, a substance of enormous energy, superseding that of any other developing agent experimented with. Metol and glycin claim similar properties, and justly so in all probability, but paramidophenol still holds its own. It is not an *en passant* developer, as many have asserted, but on account of its great resistance to oxidization, one of the most desirable media known. Scarcely had we become acquainted with the foregoing agents when another developer, triamidophenol, claims to be of still higher energy than any of the foregoing.

Photo-chemical Printing has suffered enormous changes during the last year. The old orthodox and reliable printing on albumen paper is to a great extent superseded by chloride of silver emulsion paper, with either gelatine, collodion or

celloidine, as the basis. The popularity these papers enjoy, however, is not in proportion to the results obtained, the uniformity of tones is not at all what could be desired, neither is the permanency of prints made upon these papers an established fact. The different methods of toning and fixing in a combined bath should be practiced with utmost accuracy and skill, without which permanency of the print is not possible. When adopting toning and fixing in separate solutions more satisfactory results are attainable. There are still, however, many professionals who prefer the evenness and regularity of the albumen print.

Platinum printing is in ascendancy again, but a successful rival to this very much admired process is and ever will be printing on plain or mat-surface silver paper.

Kallitypy, although paper of this kind is now manufactured in this country in excellent quality, has not made signal progress, and the process is practiced only by a few amateurs.

In reproduction processes (Lichtpaus) we still adhere largely to blue printing, enormously useful, too, for the copying of drawings or architectural plans. Other processes have been introduced again, which result in ink-colored prints, in brown and similar shades, without, however, permanently superseding the old cyanotype.

Photographic Literature.—The advances made in photographic literature are recorded in the list of publications of this and other countries, annexed to this year book.

Photography has become an aid in the pursuit of all branches of science. With the optical lantern, instructors of schools and academies explain natural phenomena, or show the intricate construction of lower animal life. The astronomer armed with photospectrograph tells us of the elements composing heavenly bodies, the physician tells us of the delicate construction of our own bodies, and of the germs of diseases the human flesh is heir to. Thus wonderful accomplishments are due to the studies of but a half century.

What will photography do yet?

Necrology.—Death has dealt but leniently with our fellow craftsmen, during the year about to pass, no very prominent men or women having been called to their last account; but the publishers of this volume, and their employees, deplore the loss of two faithful servants and co-laborers, John Hallenbeck and poor "Billy" Johnson.

THE ILLUSTRATIONS.

We concluded our introductory remarks to the descriptions of "The Pictures" in the '93 volume of The American Annual of Photography with the phrase, "Now for 1894!" and at once commenced to collect subjects for embellishing the present volume.

The number of pictures submitted for selection has been greater this year than ever before, making the task of choosing a more difficult one. All the pictures sent in have possessed a high degree of merit, and many have been left out, not because of any inferiority, but simply because there had to be a limit placed to the number.

It has been our purpose to select those pictures which would best represent the various departments of photographic work, and to illustrate special articles on the latest achievements in certain directions rather than to choose arbitrarily simply attractive subjects which bore no particular relation to the accompanying letter-press or illustrated no special advance in photographic work. It has also been thought better to confine the pictures to a few excellent processes than to represent a greater number of methods of reproduction and include some that were inferior.

Our pictures this year, therefore, are more properly *illustrations* to the volume than usually appear in books of this kind, and for the most part enhance the value of the subject-matter by their appearance as well as embellish the volume as a whole. They are greater in number than ever before, and are also an advance in quality. As photography advances we must advance with it, or rather, let us say, we must help it to advance by keeping always just a little way *in advance.*

OUR COLOR PICTURE.

The frontispiece to the present volume of American Annual of Photography is an excellent specimen of what has been accomplished in heliochromic printing, or printing in the three fundamental colors, yellow, blue and red.

Mr. William Kurtz, the maker of this illustration, and of whom every American photographer should be proud, has outstripped all his competitors. He does not supply his print with a neutral tone to secure brilliancy and effect, but, following the precepts of his predecessors, he simply eliminates all colors from the plate, excepting that particularly required.

Color sensitizer, color screen and color of the printing pigment are the important factors in this process, and in the proper selection of them lies the secret of success.

As seen by the plate before us Kurtz has mastered all the difficulties presented, and satisfies all interested in his process, the artist, the photographer, the printer and the "dear public," for his color prints are good, cheap and rapidly produced.

"FIELD STRAWBERRIES."

This attractive figure picture is another example of Miss Emily V. Clarkson's artistic work with the camera. "It was taken with a Ross lens, rather small stop; cap off and on," as Miss Clarkson writes, "about one o'clock P. M., against the sun, which I find gives much better results in out-door figure-work than when the sun shines in front upon the object. All that is necessary is simply to shield the lens from its rays with the slide of the plate holder, and give a little more time." The picture has been reproduced by the New York Photo-Gravure Co.

"THE COLUMBUS OF PHOTOGRAPHY."

This portrait of Dr. J. H. Schultze is from an old print reproduced by the Photochrome Engraving Company of New York. We refer the reader to Professor Ehrmann's interesting biographical paper for particulars.

"THE OLD HOMESTEAD."

The beautiful albertype by The Albertype Co. of New York, from Mr. Albert A. Eddy's negative entitled "The Old Homestead," is a picture entirely worthy of a place in The American Annual of Photography. The old farmhouse stands in the central part of the ancient town of Seekonk, Mass. It was photographed by Mr. Eddy just before sunset, using a blue glass in front of his lens.

The house is said to be over two hundred and fifty years old, and its quaint interior shows the huge fire-places, the tiny window panes and the low ceilings, with the immense corner and side beams painted the regulation blue of the olden time. The floors have been worn by the feet of many generations into an unevenness that speaks eloquently of the long years which have passed over the old house. It makes a beautiful object in the landscape, as the photograph clearly shows. It is a typical New England Homestead.

"IN PROSPECT PARK."

THIS half-tone engraving is from a negative by Mr. W. I. Lincoln Adams, Editor of THE ANNUAL. It is a characteristic bit of the picturesque scenery for which this park is famous. The atmospheric conditions were such that the photograph appears not unlike an engraving, and the half-tone reproduction from the negative intensifies this peculiar and pleasing effect. The photograph was made on a Carbutt plate with a Morrison lens.

"ATHLETIC CONTESTS AT CHAUTAUQUA."

THIS picture was made by a member of the Chautauqua School of Photography at Chautauqua, using a 5x7 Henry Clay camera, fitted with the regular Henry Clay lens. A Stanley plate was used and Dr. Andresen's amidol developer was employed. The exposure was one one-hundredth part of a second. This exposure shows what can be done with the ordinary Henry Clay lens in instantaneous work. Another picture in the same volume shows the excellence of this camera for landscape work.

"AN ENGLISH ROADSIDE INN."

THE Bell Inn, Snitterfield, Warwickshire. This is a roadside public-house (the brewer's wagon is standing in front of the door) which affords the only refreshment for travelers in the charming village where John Shakespeare (the poet's father) was born. Snitterfield is three or four miles northeast of Warwick, and is well worthy of a visit. The negative is by Mr. W. Jerome Harrison, F.G.S., and was taken with a "Henry Clay" 5 by 7 camera, which its owner declares "can do anything but talk!"

"ON THE DIVIDE."

This picture is characteristic of the grand mountain scenery in the western part of our country. The scene is near Denver, on the Turkey and Bear Cañon. "The distant ranges of blue and snow-capped mountains are impressive even when seen from Denver, where they are distinctly visible"; writes Mr. Warren S. Wood who made the negative, "but one has a more thorough idea of their size and distance after having traveled twenty-five miles toward them and climbed what seems to be a fair-sized mountain on the way. For such views a long-focus lens seems to be desirable; while in the Cañons through which the mountains are reached a wide angle lens of one hundred degrees hardly begins to be wide enough."

"THE BALLOON PICTURES."

The two il ustrations showing a disastrous balloon descent are fully described in the article by Mr. P. C. Goerz, on page 228, so that it is unnecessary to do more than refer the reader to that article.

"GIVE ME THE CORE."

This attractive child picture, like the illustrations referred to before, is also fully described on another page. Mr. Hickmott who made the picture, describes it fully in his article on "Doubles," which appears on page 40 of the present volume.

"A GLIMPSE OF THE WORLD'S FAIR."

It is with especial pleasure we present the readers of this year's Annual with a World's Fair picture, made by the Official Photographer, Mr. C. D. Arnold, and especially selected for this publication. It shows the North and South Canals, with the Illinois State building in the distance, the building of Mechanical Arts on the left side, the Agricultural building on the right, and the immense Manufacturers and Liberal Arts building in the distance on the right.

THE BRADFISCH & PIERCE ILLUSTRATION.

Our aristotype illustration on the well-known Bradfisch & Pierce paper this year is from a negative by Mr. J. G. Browning, of Creston, Iowa. It is an excellent specimen of portraiture and shows to good advantage the qualities of the B. & P. paper, which is a gelatine-aristotype paper.

The toning and fixing formulas for use with the B. & P. paper will be found in another part of this book, under the formulas. A neat little circular containing full directions will be mailed free to any one applying for it at the headquarters of Messrs. Bradfisch & Pierce, Bay Ridge, N. Y.

"A MODERN EUTERPIA."

This excellent specimen of portraiture is by A. N. Camp, of Jamestown, N. Y., who is one of the rising professional portraitists of the day. The print is on the New York Kalona paper, which is a collodion-aristotype paper and is rapidly coming to the front among both professionals and amateurs.

The formula for working this excellent collodion paper will be found at the proper place in another part of the book.

"OUR KLORO ILLUSTRATION."

The attractive figure picture printed on kloro paper, a gelatine aristotype manufactured by the Photo Materials Co. of Rochester, is from a negative by the brothers Rösch, the eminent portrait photographers of St. Louis. The Messrs. Rösch were awarded the $500.00 cash prize by the Photo Materials Co. at the Chicago Convention of the P. A. of A. for the best collection of prints on kloro paper. They have long been recognized as photographers of the very first rank. The prints speak for themselves, and are the best possible testimonial to the excellent qualities of the kloro paper. On another page Mr. G. D. Milburn, of the Photo Materials Co. describes his method of toning and fixing aristotype prints which he uses in connection with kloro paper.

"MOUNT HOOD."

Our two pictures of Mount Hood are notable ones, showing, as they do, the entire summit from a distance, in the one case, and the highest point of the mountain in the other, with the

W. I. Lincoln Adams, Photo.

IN PROSPECT PARK.

(BROOKLYN.)

daring mountain climber posed on the very apex of the mountain.

The first view was photographed from Rainy Camp, the place which the ascending party made its headquarters while on the mountain.

These photographs were made by George M. Weister, of Portland, Oregon, and were reproduced in Meisenbach by William Kurtz of New York.

"A GOOD USE FOR THE CAMERA,"

by Miss S. J. Eddy (who also contributes the picture entitled "Spring"), is fully described in the article following the illustration.

"Photographing the Window Sides of a room" is also described in an accompanying article.

"A REMINISCENCE OF WINTER" AND "UNDER THE WILLOWS"

are two illustrations by Mr. W. I. Lincoln Adams, editor of The Annual, accompanying his article on "Photographing Snow Scenes" and are referred to in that paper. They therefore do not require any special mention here.

"A HAPPY FAMILY" AND "SWANS"

are illustrations to an article on "Photography of Animals and Animal Motion" by Mr. Walter E. Woodbury. The three photographs are all from negatives of Mr. Charles Reid, of Wishaw, Scotland. They are referred to in the accompanying article.

"THE NEW AMPHITHEATRE AT CHAUTAUQUA,"

exterior and interior, accompany the article on the "Chautauqua School of Photography" by Prof. Charles Ehrmann, instructor of the School, and do not require special mention here.

"BUTTER IS COMING."

This pretty figure is from a negative by Mrs. Mable O. Wright, a member of the Chautauqua School of Photography. It was made with a Steinheil aplanat, upon a Seed plate, and developed with eikoquinol.

"SPRING."

This beautiful illustration is from a copyrighted negative by Miss S. J. Eddy, a skillful lady amateur of Providence, R. I. Miss Eddy contributes also an interesting paper in which she speaks of her method of work. The picture is an unusual one, reproducing the actual facts of nature in a manner so pictorial that the observer is led to believe it may be a copy of an engraving or another picture.

"THE PICNIC."

This out-of-door group was made by D. W. Carter, of Worcester, and is especially good in that it presents such excellent portraits of so many individuals and at the same time makes a pleasant picture as a whole, not only in the grouping, but also in the arrangement of the group in the landscape, and the careful selection of the point of view.

"BROTHER AND SISTER."

This pretty child picture is from a negative by Mr. George G. Rockwood, the noted professional photographer of New York, who has especially distinguished himself in photographing children. It was a trying subject for the camera, in that the little ones were clothed in white, but Mr. Rockwood has photographed them so successfully that the pretty effect of the original subject produced by the white dresses is carefully preserved. It was an instantaneous exposure of course, and the negative, as a consequence, was rather difficult to reproduce; but Mr. Gutekunst has made a success of it, as is his wont.

Standard Formulas

AND

Useful Recipes.

Compiled and Arranged by Prof. Chas. Ehrmann.

PRELIMINARY NOTES.

1. Unless otherwise directed, solids are to be weighed, and liquids to be measured.

2. Unless specially directed otherwise, the *ounce* in the case of solids is understood to be the Troy ounce (= 8 drachms, or = 480 grains). And in the case of liquids, the ounce is understood to be the fluid-ounce, U. S. measure (1 gallon = 8 pints; 1 pint = 16 fl. oz.; 1 fl. oz. = 480 minims.

3. When Acetic Acid is mentioned, that of 36 per cent. strength, spec. gr. 1.048 (U. S. Ph.), is understood.

4. Glacial Acetic Acid is intended to be an acid containing about 85 per cent. of the absolute acid.

5. In accordance with the custom now more and more coming into use, the chemical names of salts are given preferably so that the name of the base is the name of the element itself, and not an oxide of the element. For instance: carbonate of sodium, instead of carbonate of soda; bicarbonate of potassium, instead of bicarbonate of potassa (or potash); sulphite of calcium, instead of sulphite of lime, etc.

6. Instead of giving the strength of certain solutions by the heretofore customary but very confusing method of using two figures with a colon between, for instance, 1:5, which is variously interpreted as meaning either 1 *in* 5, or as 1 *to* 5 (this being then actually 1 in 6), we use in all cases the former expression (1 in 5, 1 in 10, etc.).

Abbreviations.—gr. stands for grains.
Gm. " " gramme.
C.c. " " cubic centimeter.

Standard Formulas and Useful Recipes.

THE WET COLLODION PROCESS.

1.—Negative Collodion.

Ether	¼ fluid ounce
Absolute alcohol	½ fluid ounce
Pyroxyline	5 gr.
Iodide of ammonium	5 gr.
Bromide of cadmium	2 gr.

2.—Ferrotype Collodion (Estabrooke's).

Iodide of ammonium	30 gr.
Iodide of sodium	10 gr.
Iodide of cadmium	20 gr.
Bromide of cadmium	20 gr.
Ether and alcohol (of each)	5 ounces
Pyroxyline, sufficient quantity, say	25 gr.

3.—Collodion for the Reproduction of Line Work (Volkmer's).

Plain Collodion.		*Sensitizer.*	
Ether	700 C.c.	Chloride of calcium	1.6 Gm.
Alcohol	490 C.c.	Iodide of ammonium	4.7 Gm.
Pyroxyline	16 Gm.	Iodide of cadmium	7.8 Gm.
		Absolute alcohol	123 C.c.

After being perfectly dissolved, mix.

4.—Silver Bath for Wet-Plates.

Nitrate of silver	1 ounce
Distilled water	10 ounces

Iodize and acidulate with nitric acid.

5.—Silver Bath for Wet-Plates (Liesegang's).

Nitrate of silver	10 Gm.
Distilled water	150 C.c.

If the bath fogs, add a few drops of iodine solution (1 part iodine to 10 parts of alcohol).

6.—Silver Bath for Ferrotypes (Estabrooke's).

Nitrate of silver	4 ounces
Water	64 ounces
Iodide potassium	2 gr.

Dissolve, sun for three or four hours, filter and acidulate.

7.—Developer for Ferrotypes, by E. P. Grishold.

Protosulphate of iron and ammonia	4 ounces
Water	64 ounces
Acetic acid, 1.048 (U. S. Ph.)	4 ounces
Yellow rock candy	½ ounce

8.—Developer for Wet-Plates.

Sulphate of iron and ammonia	1 ounce
Acetic acid, 1.048 (U. S. Ph.)	1½ ounces
Water	16 ounces

9.—Developer for Hard Negatives (Line Work) Wet-Plates.

Protosulphate of iron	5 Gm.
Water	100 C.c.
Tartaric acid	1 Gm.

10.—Developer for Wet-Plates (Very Intense).

Protosulphate of iron	36 Gm.
Sulphate of copper	12 Gm.
Water	1000 C.c.
Glacial acetic acid, 85 per cent	50 C.c.
Alcohol	40 C.c.

11.—Intensifier for Wet-Plates.

Saturated solution of protosulphate of iron	20 C.c.
Acetic acid, 1.048 (U. S. Ph.)	10 C.c.
Citric acid	5 Gm.
Water	200 Gm.

And silver solution to suit.

12.—Intensifier for Wet-Plates.

Pyrogallic acid	1 Gm.
Citric acid	3 Gm.
Water	80 C.c.

And silver solution to suit.

13.—Intensifier for Line Work, Wet-Plates.

A.—Bromide of potassium	½ ounce
Water	4 ounces
B.—Sulphate of copper	½ ounce
Water	4 ounces

Mix equal parts of A and B, and pour on the film. When perfectly whitened, blacken with solution of nitrate of silver, 30 grains to the ounce.

For greater intensity, use hydrosulphate of ammonia solution, 1 part in 4 parts of water, after the bromide of copper, and thorough washing.

14.—Intensifier for Wet-Plates.

Red prussiate of potash	2 drachms
Nitrate of lead	3 drachms
Water	12 ounces

Immerse the fixed negative till thoroughly whitened; wash, and flood with solution of hydrosulphate of ammonia.

15.—To Strip Collodion Negatives.

The best way to do this is to coat the negative, when dry, with a solution of pure rubber in benzole, and afterwards with leather collodion. When perfectly dry, the edges of the negatives may be cut in, and the plate immersed in a diluted acetic acid solution 1:10. After a short time the film loosens, and may easily be detached from the plate, and turned.

16.—To Rectify a Negative Silver Bath,

Dissolve 1 part of permanganate of potassium in 100 parts of water, and add drop by drop so much of this solution to the bath impregnated with organic matter, till, after vigorously shaking, a slight pinkish color remains.

Sun for several hours, filter and test for neutrality. Acidify with nitric acid.

DRY COLLODION PROCESSES.

17.—Collodio-Bromide Emulsion.

Ether, sp. g. 0.720	5 fluid ounces
Alcohol, sp. g. 0.820	3 fluid ounces
Pyroxyline	50 gr.
Bromide of cadmium and ammonium	80 gr.
(or bromide of zinc.....76 gr.)	

Sensitize by adding to each ounce 15 grains of nitrate of silver, dissolved in 1 drachm of boiling alcohol mixed with a few drops of water. This is suitable for slow landscape work or transparencies.

18.—Washed Emulsion for Transparencies.

Ether, sp. g. 0.720	5 fluid ounces
Alcohol, sp. g. 0.820	3 fluid ounces
Pyroxyline	60 gr.
Bromide of cadmium and ammonium	100 gr.
(or bromide of zinc	90 gr.)
Hydrochloric acid, sp. g. 1.2	8 minims

Sensitize with 20 grains of nitrate of silver to the ounce, dissolved in 2 drachms of boiling alcohol, mixed with just enough water to effect solution. Allow to stand for two or three days.

The emulsion, after being allowed to ripen, should be poured into a dish and set aside to become thoroughly dry. The mass of dry emulsion is then washed, to remove all soluble salts, and is then again dried and redissolved in equal parts of ether and alcohol, at the rate of from 20 to 24 grains to the ounce of the solvents.

19.—Developer for Collodion Emulsion.

A.—Pyrogallol	96 gr.
Alcohol	1 fluid ounce
B.—Bromide of potassium	10 gr.
Water	1 fluid ounce
C.—Stronger ammonia, sp. g. 0.900	1 fluid drachm
Water	15 fluid drachms
or,	
D.—Carbonate of ammonium	2 gr.
Water	1 fluid ounce

For each drachm of developer take, for a normal exposure, 5 minims of A, 1 or 2 minims of B, and 1 or 2 minims of C; or, if D be used, add the above quantities of A, B and C to 1 drachm of D. When the details of the image are out, add double the quantity of B and C.

ALBUMEN PROCESSES.

20.—Gobert's Albumen Process.

Albumen from fresh eggs	26 drachms
Iodide of ammonium	15 gr.
Bromide of potassium	4 gr.
Iodine	4 gr.

Sensitize in

Nitrate of silver	155 gr.
Distilled water	4 ounces
Glacial acetic acid	150 gr.

Albumen plates are developed with saturated solution of gallic acid with a few drops of aceto-nitrate of silver solution (1 in 30).

21.—Whipple & Black's Albumen Honey Process.

Albumen	8 ounces
Honey	7 ounces
Iodide of potassium	3 drachms
Bromide of potassium	20 gr.
Chloride of sodium	10 gr.
Water	2 ounces

Sensitize in bath of the following proportions:

Nitrate of silver	1 ounce
Water	10 ounces
Acetic acid	8 to 10 drachms

For development, see above (No. 20).

GELATINE DRY-PLATE PROCESSES.

22.—W. K. Burton's Gelatine Emulsion.

A.—Bromide of ammonium ..... 260 gr.
Iodide of potassium ..... 20 gr.
Gelatine (Nelson, No. 1) ..... 80 gr.
Distilled water ..... 10 ounces

B.—Silver nitrate ..... 200 gr.

C.—Silver nitrate ..... 200 gr.
Distilled water ..... 1 ounce

Converted to ammonio-nitrate.

D.—Gelatine, hard (dry) ..... 600 gr.

For detailed directions for making the emulsion, see *Photographic Times*, Vol. XVII., page 285.

23.—Burbank's Gelatine Emulsion.

Bromide of ammonium ..... 15 to 20 gr.
Water ..... 1 ounce

or,

Bromide of potassium ..... 18 to 25 gr.
Nitrate of silver, proportioned to the amount of bromide ..... 25 to 30 gr.
Gelatine ..... 30 to 40 gr.

See Burbank's "The Photographic Negative," pages 87–109.

24.—Henderson's Gelatine Emulsion by Ammonia Method.

Dissolve

Bromide of ammonium ..... 308 gr.
Gelatine ..... 50 gr.

Previously swelled

In distilled water ..... 8½ ounces

When cold, add

Water ..... 1¾ ounces
Alcohol ..... 1¾ ounces
Stronger ammonia (0.900) ..... ½ ounce

Next dissolve by heat

Nitrate of silver ..... 462 gr.
In distilled water ..... 3¾ ounces

and add gradually to the gelatine solution. Ripening for twenty-four hours gives sensitiveness to the emulsion. Add, finally, 220 grains of swelled gelatine.

25.—Dr. J. M. Eder's Gelatine Emulsion with Ammonio-Nitrate of Silver.

In distilled water, 10 ounces, dissolve bromide of potassium, 370 grains; add gelatine, 617 grains, previously swelled in water. In distilled water, 10 ounces, dissolve nitrate of silver, 462 grains.

To this solution, cold, add stronger ammonia, drop by drop, until the precipitate first formed is redissolved. Add this gradually to the first solution, and place in a water bath at a temperature of 105 deg. Fahr., for 30 to 45 minutes. Then remove the source of heat, and allow the emulsion to cool down gradually to about 75 deg. Fahr., then pour out to set, and proceed as usual.

DEVELOPMENT OF GELATINE EMULSION PLATES.

26.—Carbutt's Pyro Developer.

No. 1. Pyro Stock Solution.

300 C.c.	Distilled or ice water	10 ounces
1 Gm.	Oxalic acid	15 gr.
2 Gm.	Bromide potassium	30 gr.

Then add Schering's pyro, 1 ounce (30 grammes), and water to make 16 fluid ounces (480 C.c.).

No. 2. Stock Soda Solution.

300 C.c.	Water	10 ounces
60 Gm.	Soda sulphite crystal	2 ounces
60 Gm.	Soda Carb. Crys. (or dry gran. 1 oz)	2 ounces
30 Gm.	Potash Carbonate	1 ounce

Dissolve, and add water to make measure 16 fluid ounces (480 C.c.).

No. 3. Bromide Solution.

14 Gm.	Bromide of sodium or potassium	½ ounce
150 C.c.	Water	5 ounces

Pyro Developer.—Dilute 2 ounces of stock No. 2 with 7 ounces of water for cold weather, and 10 to 12 of water in summer. To 3 ounces of dilute No. 2 add 1½ to 2½ drachms (6 to 10 C.c.) of No. 1. The more pyro the denser the negative, and *vice versa.* No yellowing or fogging need be apprehended if our directions are followed. Development should be continued until the image seems almost buried, then wash and place in fixing bath.

For instantaneous exposures, take for a 5 x 8 or 6½ x 8½ plate 3 ounces of dilute No. 2. Lay the plate to soak in this, and cover pan. Put 2 drachms of No. 1 into the graduate, and 3 drops of bromide solution. Pour the soda solution off of the plate into the pyro and back over the plate; let development proceed, and examine occasionally. Keep solution in gentle motion over the plate. A *very* short exposure may take ten minutes to fully develop. If the image is not fully brought out this time, add to developer in pan three times its bulk of water, and let plate lie in it covered over half an hour or more if necessary, until full development is attained; then wash, and proceed as directed under head of developer

27.—Eikonogen and Hydrochinon Developer (for Carbutt's Orthochromatic Plates, "Celluloid" Films and Transparencies).

A.

Metric Weight.		Avoirdupois Weight.
600 C.c.	Distilled water	20 ounces
120 Gm.	Sulphite of soda crystals	4 ounces
22 Gm.	Eikonogen	330 gr.
10½ Gm.	Hydrochinon	160 gr.
960 C.c.	Water to make up to	32 ounces

B.

Metric Weight.		Avoirdupois Weight.
600 C.c.	Distilled water	20 ounces
60 Gm.	Carbonate of Potash	2 ounces
60 Gm.	Carbonate soda crystals	2 ounces
960 C.c.	Water to make up to	32 ounces

Developer.—For instantaneous exposures, take (30 C.c.) 1 ounce A, (30 C.c.) 1 ounce B, (120 C.c.) 4 ounces water; for portraits, take (30 C.c.) 1 ounce A, (30 C.c.) 1 ounce B, (150 C c.) 5 ounces water; for landscapes, full exposures, sens. 20-27, take (30 C.c.) 1 ounce A, (15 C.c.) ½ ounce B, (90 C.c.) 3 ounces water; for landscapes, full exposures, sens. 16-20, take

(30 C.c.) 1 ounce A, (25 C.c.) ¾ ounce B, (120 C.c.) 4 ounces water; for lantern slides, full exposures, take (30 C.c.) 1 ounce A, (25 C.c.) ¾ ounce B, (120 C.c.) 4 ounces water, and 2 to 6 drops Restrainer D to each ounce of developer.

NOTE.—More of A will increase density, more of B will increase detail and softness. Temperature of developer should not vary much below 65 degs. nor above 75 degs. The after-treatment is the same as with any other developer.

28.—CARBUTT'S EIKONOGEN AND HYDROCHINON DEVELOPER.

A.

600	C.c.	Warm distilled water	20 ounces
120	Gm.	Sulphite soda crystals	4 ounces
4	Gm.	Sulphuric acid	1 drachm
23½	Gm.	Hydrochinon	300 gr.
2	Gm.	Bromide potass	30 gr.
960	C.c.	Water to make up to	32 ounces

B.

60 Gm.	Carbonate potash	2 ounces
60 Gm.	Carbonate soda crystals	2 ounces
960 C.c.	Water to make	32 ounces

C.—*Accelerator.*

30 Gm.	Caustic soda	1 ounce
300 C.c.	Water	10 ounces

For under-exposure, add a few drops of above to developer.

D.—*Restrainer.*

14 Gm.	Bromide potass	½ ounce
150 C.c.	Water	5 ounces

☞ For proportions, see developer above.

29.—CARBUTT'S NEW ACID FIXING AND CLEARING BATH.

4 C.c.	Sulphuric acid	1 drachm
480 Gm.	Hyposulphite of soda	16 ounces
60 Gm.	Sulphite of soda	2 ounces
30 Gm.	*Chrome alum	1 ounce
1920 C.c.	Warm water	64 ounces

Dissolve the hyposulphite of soda in 48 ounces (1440 C.c.) of water, the sulphite of soda in 6 ounces (180 C.c.) of water, mix the sulphuric acid with 2 ounces (60 C.c.) of water, and pour slowly into the sulphite soda solution, and add to the hyposulphite; then dissolve the chrome alum in 8 ounces (240 C.c.) of water and add to the bulk of solution, and the bath is ready. This fixing bath will not discolor until after long usage, and both clears up the shadows of the negative and hardens the film at the same time.

After negative is cleared of all appearance of silver bromide, wash in running water for not less than half an hour to free from any trace of hypo solution. Swab the surface with wad of wet cotton, rinse, and place in rack to dry spontaneously.

30.—CARBUTT'S CLEARING SOLUTION TO REMOVE YELLOW STAIN CAUSED BY DEVELOPER.

600 C.c.	Water	20 ounces
90 Gm.	Sulphate of iron	3 ounces
30 C.c.	Sulphuric acid	1 ounce
30 C.c.	Alum	1 ounce

If, after developing and fixing your negative, it is found to be stained

* N. B.—During cold weather use only half the quantity of chrome alum in above.

yellow from the pyro or hydrochinon developer, first wash well to remove all hyposulphite, then immerse in above solution until the stain is removed; again wash well, and dry.

N. B.—It will improve lantern slides to immerse them for a few minutes in the clearing solution after being well freed from hyposulphite.

31.—Carbutt's Intensifying Solution.

Intensification.—With correct exposure and development, intensification need never be resorted to. The following formula is, however, very effective, and the most permanent of all methods:

No. 1.

16 Gm.	Bichlor. mercury	240 gr.
16 Gm.	Chloride ammonia	240 gr.
600 C.c.	Distilled water	20 ounces

No. 2.

16 Gm.	Chloride ammonia	240 gr.
600 C.c.	Water	20 ounces

No. 3.—*Cyanide-Silver Solution.*

180 C.c.	Distilled water	6 ounces
4 Gm.	Cyanide potass., C. P.	60 gr.
60 C c.	Distilled water	2 ounces
4 Gm.	Nitrate of silver	60 gr.

Pour the silver into the cyanide solution while stirring, and mark bottle *poison.*

Let the plate to be intensified wash for at least half an hour, then lay in a 5 per cent. solution of alum for ten minutes, and again wash thoroughly; this is to insure the perfect elimination of the hypo. The least trace of yellowness after intensifying shows that the washing was not sufficient.

Flow sufficient of No. 1 over the negative to cover it, and allow to either partially or entirely whiten; *the longer it is allowed to act,* the *more intense* will be the result; pour off into the sink, rinse, and flow over No. 2, and allow to act one minute; wash off, and pour over or immerse in No. 3 until changed entirely to a dark brown or black. No. 3 can be returned to its bottle, but Nos. 1 and 2 had better be thrown away. Wash thorougly and dry.

32.—Wuestner's Developers for New Eagle Lightning, New Orthochromatic and Imperial Non-Halation Plates.

Developing Formula.—These plates can be successfully worked with any good developer. For producing the finest negatives, with shortest possible exposure, we recommend the following "sal soda" developer:

No. 1. *Pyro Stock Solution.*

Water	84 ounces
Sulphite soda crystals	1 pound
Pyrogallic acid	2 ounces
Sulphuric acid, C. P	10 drops

No. 2. *Soda Stock Solution.*

Water	84 ounces
Sal soda (crystals)	8 ounces

Developer.—Take 2 ounces of No. 1, and 2 ounces of No. 2, and add 8 ounces of water.

This developer may be used repeatedly as long as it remains clear, but will work slower and with more intensity when old. Therefore the fresh

developer is best for short exposures, and the old is better if the plate has been full timed. In using the sal soda developer, *it is very important, to carry the development far enough, until the lights have sufficient intensity when examining the plate by transmitted light.*

Over-exposure is corrected by adding to each ounce of developer from 2 to 4 drops of the following solution: Bromide of ammonium, 1 ounce to 10 ounces of water; or by putting the plate into a weak solution of bromide of ammonium (1 to 50 water), before the development has proceeded too far, and then returning it to the developer, to gain sufficient intensity.

If under-exposure is noticed, take the plate out of developer, and, without draining, put into "soda solution"; sufficient developer will remain in the film to develop the shadows, the lights being prevented from gaining too much density in this way.

33.—Wuestner's Eikonogen Developer for Portraits and Landscapes.

No. 1.

2400 C.c.	Distilled or ice water	80 ounces
115 Gm.	Sulphite of soda (crystals)	3½ ounces
4 Gm.	Oxalic acid	1 drachm
75 Gm.	Eikonogen	2½ ounces
15 Gm.	Yellow prussiate of potash	½ ounce

No. 2.

600 C.c.	Distilled or ice water	20 ounces
60 Gm.	Carbonate of potash	2 ounces

Developer.—Take 4 ounces of No. 1 and ½ ounce of No. 2.

For instantaneous exposures, we recommend the following eikonogen developer:

Dissolve in

300 C.c.	Distilled or ice water	10 ounces
20 Gm.	Sulphite of soda crystals	⅔ ounce
10 Gm.	Carbonate of potash	⅓ ounce

And then add

10 Gm.	Eikonogen	⅓ ounce

Fixing Bath.

Water	100 parts
Sulphite soda (crystals)	5 parts
Sulphuric acid, C. P.	1 part

And add

Hyposulphite of soda	20 parts

This fixing bath cannot be excelled; you will always get a clear and brilliant negative, no yellow stains, a good printing color, and the plate will fix in considerable less time.

After fixing, place the negative in a dish containing a 10 per cent. chrome alum solution; let it remain a few minutes to harden the film, then wash thoroughly.

In tropical climates, we recommend putting the plates in the alum solution before fixing.

34.—Wuestner's Amidol Developer.

1000 C.c.	Water	34 ounces
60 Gm.	Sulphite of soda (crystals)	2 ounces
1 Gm.	Bromide of ammonium	15 gr.

Dissolve, and add 4 to 6 grains (from 1 to 1½ drachms) amidol just before using.

For instantaneous exposures, take double the quantity of sulphite of soda (crystals) 120 grammes (4 ounces).

It is advisable to put this developer up in small quantities.

35.—Direction for Working the Cramer Plate.

Eikonogen Developer.

No. 1.

Metric Weights and Measures.			Engl. Measures, Troy Weight.
1200 C.c.	Distilled water	Hydrometer test 15.	40 ounces
60 Gm.	Sulphite of sodium crystals		2 ounces
30 Gm.	Eikonogen		1 ounce

Boil for a few minutes. After cooling, pour into a bottle and keep it well stoppered.

No. 2.

300 C.c.	Water	10 ounces
30 Gm.	Carbonate of potassium	1 ounce

For Use.

90 C.c.	Solution No. 1	3 ounces
30 C.c.	Solution No. 2	1 ounce

In hot weather, dilute with an equal quantity of cold water. This developer can be used repeatedly by occasionally adding more of Solution No. 1 and 2.

To obtain thin negatives, full of detail, such as are required for printing on Aristo Paper, use the developer more diluted.

For negatives of greater density, add to solution No. 1:

4 Gm.	Hydrochinon	1 drachm

Pyro Developer.

Alkaline Solution.

1800 C.c.	Water	60 ounces
150 Gm.	Carbonate of sodium crystals (sal soda)	5 ounces
300 Gm.	Sulphite of sodium crystals	10 ounces

A smaller quantity of sulphite will produce a warmer tone, a larger quantity a gray or bluish-black tone.

The alkaline solution must be kept in well-stoppered bottles.

If the negatives show yellow stain, make a fresh solution, or try another lot of sulphite of sodium.

Pyro Solution.

180 C.c.	Distilled or pure ice water	6 ounces
1 C.c.	Sulphuric acid	15 minims
4 Gm.	Sulphite of sodium crystals	1 drachm
30 Gm.	Pyrogallic acid	1 ounce

All pyro solutions work best while fresh.

8 grains dry pyro may be substituted for 1 drachm of this solution.

Mix in the following proportions:

10 C.c.	Pyro solution	1 drachm
80 C.c.	Alkaline solution	1 ounce
160 C.c.	Tepid water (for winter use)	2 ounces
	or,	
240 to 400 C.c.	Cold water (for summer use)	3 to 5 ounces

Fixing Bath.—The negatives may be fixed in a plain hypo bath, 1 part hyposulphite of soda to 4 parts of water; but the following bath is especially recommended.

Prepare two solutions.

No. 1.

1 kilo	Hyposulphite of soda	32 ounces
3 liter	Water	3 quarts

No. 2.

1 liter	Water	1 quart
15 C.c.	Sulphuric acid	½ ounce
120 Gm.	Sulphite of sodium crystals	4 ounces
90 Gm.	Chrome alum	3 ounces

After the ingredients are dissolved, pour No. 2 solution into No. 1.

During the cold season, one-half the quantity of No. 2 is sufficient.

Cramer's Isochromatic Plates are developed and fixed with the same solutions.

36.—Potash Developer for "Harvard" Dry-Plates.

A.—Distilled water.	12 ounces
Sulphite of soda (crystals)	2 ounces
Citric acid	60 gr.
Bromide of ammonium	25 gr.
Phrogallic acid	1 ounce

Dissolve separately, mix in order named and filter.

B.—Distilled water	12 ounces
Sulphite of soda (crystals)	2 ounces
Carbonate of potash	4 ounces

Dissolve separately, mix and filter.

The stock solutions must be kept in well stoppered bottles. The pyro stock solution will remain clear and in good order for about a month. It should not be used after it has turned dark and muddy from age.

To develop, mix A, 1 drachm; B, 1 drachm; water, 2 ounces. For detail, add more water; for contrast, more A; for density, more of each, A and B. For instantaneous or short exposures, use double the quantity of water (4 ounces) to begin with; pour off when about half developed, and finish with developer, full strength.

After development, and before fixing, it is well to flow the negative with a saturate solution of alum. Rinse, and fix in the following solution:

Hyposulphite of soda	1 pound
Water	2 quarts

Many prefer to add alum to the fixing solution (about 1 ounce to the above), to which there is no serious objection, provided, always, it is filtered occasionally.

THE "SEED" PLATE.

37.—Pyro Developer.

No. 1.

Pyrogallic acid	1 ounce
Sulphite of soda (crystals)	4 ounces
Water, distilled or good well water	16 ounces

No. 2.

Sal soda	4 ounces
Water	16 ounces

To develop, take

No. 1	1 ounce
No. 2	1 ounce
Water	8 ounces

In warm weather, use more water; in cold weather, less.

Where Aristo Paper is used, the negative must be much thinner and fuller of detail than is required for albumen paper; therefore, take

No. 1	1 ounce
No. 2	1½ ounces
Water	10 ounces

38.—Pyro Developer by Use of Hydrometer.

Make stock solution of sulphite of soda to test 60 with hydrometer; allow to settle perfectly clear, then take

Sulphite of soda solution	16 ounces
Pyro	1 ounce
Sulphuric acid	10 drops

(Or oxalic acid, 10 gr.)

No. 2.

Sal soda solution, hydrometer test 40.

To develop, take

Water	8 ounces
No. 1	1 ounce
No. 2	1 ounce

In warm weather, use more water; in cold weather, less.

Where Aristo Paper is used, the negative must be much thinner and fuller of detail than is required for albumen paper; therefore, take

No. 1	1 ounce
No. 2	1½ ounces
Water	10 ounces

39.—Eikonogen Developer—No. I.

No. 1.

Sulphite of soda (crystals)	3 ounces
Hot water	45 ounces

Thoroughly dissolve, then add

Eikonogen	1 ounce

No. 2.

Sal soda	4 ounces
(Or carb. of potassium, 1¼ ounces.)	
Water	15 ounces

To develop, take of

No. 1	3 ounces
No. 2	1 ounce

Fixing Bath.

Alum	¼ ounce
Hyposulphite of soda	5 ounces
Water	16 ounces

40.—Eikonogen Developer—No. II.

Make stock solution of sulphite of soda, 40 by hydrometer test.

No. 1.

Hot water	30 ounces
Eikonogen	1 ounce

Thoroughly dissolve, then add

Sulphite of soda solution	10 ounces

No. 2.

Sal soda	12 hydrometer test

To develop, take equal parts of Nos. 1 and 2.

Fixing Bath.

Alum	¼ ounce
Hyposuiphite of soda	5 ounces
Water	16 ounces

41.—The Following is an Excellent Formula for Producing Strictly White and Black Results, such as is Required for the Reproduction of Printed Matter, Engravings, Etc.

No. 1.

Iodine crystals	4 gr.
Alcohol	1¾ ounces

No. 2.

Bromide of potassium	60 gr.
Water	25 ounces

Add together Nos. 1 and 2, and to develop, add 1 ounce to every 8 or 10 ounces of developer.

To harden the film during development in hot climates, take sulphate of magnesium, 1 ounce; water, 8 ounces; add of this ½ ounce to each 16 ounces of developer.

42.—Para-amidophenol Developer.

Para-amidophenol hydrochlorate	150 gr.
Sulphide sodium in crystals (Andresen's)	1½ ounces
Potassium carbonate	1½ drachms
Water	32 ounces

May be diluted in the proportion of from 1 : 8 to 1 : 12.

43.—Rodinal.

Metabisulphite of potassium	30 Gm.
Para-amidophenol hydrochlorate	10 Gm.
Potassium hydrate	To neutralization
Water	100 Gm.

This developer permits to be diluted in the proportion of 1 : 40.

44.—Amidol Developer.

Dissolve 10 ounces of neutral sodium sulphite in crystals (Andresen's) in 50 ounces of distilled water, and add 1 ounce of amidol. Dissolve, filter quickly, and fill up in small bottles.

For use, dilute with from 2 to 4 volumes of water.

Do not spare bromide of potassium.

45.—Dr. Stolze's Amidol Developer.

A.—Distilled water	100 Gm.
Potassium metabisulphite	25 Gm.
Amidol (Andresen's)	5 Gm.
B.—Distilled water	100 Gm.
Potassium bicarbonate	20 Gm.

To 100 C.c. of water add 10 C.c. of A, and of B from 5 to 50 C.c., according to time of exposure. For normal exposures, 20 C.c. are sufficient.

Do not apply the solution till effervescence has ceased.

46.—Crystallos.

Sodium sulphite cryst	8 ounces
Ferrocyanide potassium	2½ ounces
Hydrochinon	1½ ounces
Caustic potash solution (75 per cent)	2 ounces
Distilled water	28 ounces

Dissolve the first three substances in 20 ounces of water, then add the caustic potash solution, finally the rest of the water. The Paris crystallos is tinted red with aniline dye, which, however, has no influence upon its action.

Dilute the solution with from 1 to 5 and 8 volumes of water.

47.—Potash Developer for Gelatine Dry-Plates (Dr. Stolze's).

Modified by Dr. Eder.

A.—Carbonate of potassium	90 Gm.
Sulphite of sodium, cryst	25 Gm.
Water	200 C.c.
B.—Water	100 C.c.
Sulphite of sodium, cryst	25 Gm.
Pyrogallol	12 Gm.

Mix 40 minims of A with 50 minims of B and 100 C.c. of water.

Bromide of potassium should be used only in minimal quantities, 1 to 3 minims (of a 10 per cent. solution); with more, the general sensitiveness is much reduced.

An alum bath mixed with an equal volume of saturated sulphate of iron solution increases the density, and gives the plate a good printing quality.

48.—Soda Potash Developer for Gelatine Dry-Plates (New York Amateur Club).

Ferrocyanide of potassium	1½	ounces
Carbonate of potassium	1½	ounces
Gran. carb. of sodium	1	ounce
Cryst. sulphite of sodium	2	ounces
Hot distilled water	10	ounces

49.—Soda Developer in One Solution for Gelatine Dry-Plates (Eder's Formula).

Crystallized sulphite of sodium	5	drachms
Carbonate of sodium	2½	drachms

Dissolve in 2 ounces of boiled distilled water, and, after having cooled down, add 46 grains of pyro. Keep in well-stoppered bottles, and for use dilute with five times its bulk of water.

50.—Ferrous-Oxalate Developer for Gelatine Dry-Plates (Dr. Eder's).

A.—Neutral oxalate potassium	200 Gm.
Distilled water	800 C.c.

Acidulate with oxalic acid.

B.—Protosulphate of iron, cryst.	100 Gm.
Distilled water	300 C.c.
Sulphuric acid	5 minims
C.—Bromide of potassium	10 Gm.
Distilled water	100 C.c.
D.—Hyposulphite of sodium	2 Gm.
Distilled water	200 C.c.

Mix immediately before use 3 volumes of A with 1 volume of B, and develop. Restrain with a few drops of C.

For over-exposure, take less of the iron solution, and add gradually in small portions, as required. To give the negative body, use C.

To make soft negatives with fine detail, take of

A	250 C.c.
B	50 C.c.
C	40 minims
D	16 minims

Plates giving with ordinary developer hard and glassy negatives, give with this modification very satisfactory results.

51.—"Chautauqua" Developer, with Ammonia, for Gelatine Dry-Plates.

A.—Bromide ammonium	¼	ounce
Water	8	ounces
B.—Stronger ammonia (0.900)	1	ounce
Water	7	ounces
C.—Pyrogallol	1	drachm
Nitric acid	5	minims
Water	12	ounces

Take for correct exposure of A 40 minims, of B 20 minims, of C ½ ounce, and 2 ounces of water.

52.—"Chautauqua" Developer, with Carbonate of Sodium, for Gelatine Dry-Plates.

A.—Dissolve 3 ounces of granulated sulphite of sodium and ¼ ounce of meta-bisulphite of potassium in 32 ounces of distilled water, and add 1 ounce of pyrogallic acid.

Keep in well stoppered bottles.

From a negative by a Chautauquan. Taken with a Henry Clay Camera (regular lens).

ATHLETIC CONTESTS AT CHAUTAUQUA.

B.—Dissolve 8 ounces of granulated, or 16 ounces of crystallized, carbonate of sodium (common washing soda), in water enough to make a bulk of 32 ounces.

Mix 1 ounce of water with 1 drachm of A, add a few drops of B, and increase gradually till development proceeds regularly. If necessary, restrain with 10 per cent. solution of bromide of potassium.

53.—"CHAUTAUQUA" DEVELOPER, WITH CARBONATE OF POTASSIUM, FOR GELATINE DRY-PLATES.

A.—Pyro	1	ounce
Sulphite of sodium, granulated	2	ounces
Bromide of potassium	80	gr.
Citric acid	60	gr.
Water	12	ounces
B.—Water	12	ounces
Sulphite of sodium, granulated	1	ounce
Carbonate of potash	3	ounces

1 drachm of each—A and B—to 1 ounce of water, make the developing solution.

54.—"CHAUTAUQUA" DEVELOPER, WITH HYDROCHINON, FOR GELATINE DRY-PLATES.

A.—Hydrochinon	¼	ounce
Sulphite of sodium, granulated	1	ounce
Meta-bisulphate of potassium	30	gr.
Water	16	ounces
B.—Carbonate of potassium	1½	ounces
Water	16	ounces

55.—"CHAUTAUQUA" HYDROCHINON DEVELOPER IN ONE SOLUTION.

Hydrochinon	½	ounce
Sodium sulphite, granulated	2	ounces
Potassium carbonate	2	ounces
Water	32	ounces

For use, dilute 1 volume with 3 volumes of water.

56.—"CHAUTAUQUA" DEVELOPER WITH EIKONOGEN IN TWO SOLUTIONS.

A.—Eikonogen	128	gr.
Crystallized sulphite of sodium	1	ounce
Dissolve in warm water	16	ounces
B.—Crystallized carbonate of sodium	1½	ounces
Water	10	ounces

For normal exposures, take 3 parts of A and 1 part of B. To promote intensity, add a few drops of a 10 per cent. solution of bromide of potassium.

57.—"CHAUTAUQUA" DEVELOPER WITH EIKONOGEN. (In one solution, for instantaneous work.)

Eikonogen	120	gr.
Crystallized sulphite of sodium	1½	ounces

Dissolve in 8 ounces of hot water and add carbonate of potassium 120 grains.

For use, dilute with an equal bulk of water, and add a few drops of a 10 per cent. solution of bromide of potassium.

58.—"CHAUTAUQUA" FERROUS OXALATE DEVELOPER. See No. 50.

59.—"Chautauqua" Developer, with Hydrochinon, for Gelatine Dry-Plates.

A.—Hydrochinon	120	gr.
Sulphite of sodium, granulated	1	ounce
Meta bisulphate of potassium	30	gr.
Water	16	ounces
B.—Carbonate potassium	1½	ounces
Water	16	ounces

Take equal parts for normal exposures. For over or under-exposures, proceed as with pyro.

60.—Developer for Gelatine Ferrotypes (Phœnix Plates).

A.—Pyrogallol	1 drachm
Water	12 ounces
Nitric acid	5 drops
B.—Water	12 ounces
Bromide potassium	4 drachms
Aqua ammonia fort	4 fluid drachms
Nitrate potassium	3 fluid drachms
Chlorate potassium	1 fluid drachm
White rock candy	1 fluid drachm

For use, take of A 1 drachm, of B 3 drachms, to 1½ ounces of water. Fix in cyanide of potassium, 1 in 20.

61.—The Acid Fixing and Clearing Bath.

Add 2 ounces of S. P. C. Clarifier (acid bisulphite of sodium) solution to 1 quart of hypo solution 1 in 5.

62.—Combined Alum and Hypo Bath.

Add saturated solution of sulphite of sodium to saturated solution of alum till the white precipitate formed remains undissolved, and when the odor of sulphurous acid becomes perceptible.

Mix this solution with an equal bulk of freshly-prepared hypo solution 1 in 5, and filter.

This bath will remain clear.

63.—Clearing Solution (Edward's).

Alum	1 ounce
Citric acid	1 ounce
Sulphate of iron, crystals	3 ounces
Water	20 ounces

This should be freshly mixed.

64.—Belitzki's Method for Removing the Last Traces of Hypo.

Chloride of Lime	20 Gm.
Water	1 liter

Add to the milky liquid

Sulphate of zinc	40 Gm.

dissolved in from 80 to 100 C.c. of water; shake well and decant.

The clear, supernatant solution of hypochlorite of zinc is kept in well-closed bottles; 1 part of it mixed with 60 parts of water will remove the last traces of fixing soda.

The solution remains active as long as it smells of hypochlorous acid.

65.—To Remove Hypo from Films.

A solution of bromine in water, about 1 in 30, destroys the hypo in a gelatine film.

66.—Carbutt's Intensifier.

No. 1.

Bichloride of mercury	240 gr.
Chloride of ammonium	240 gr.
Distilled water	20 ounces

No. 2.

Chloride of ammonium	480 gr.
Water	20 ounces

No. 3.

Sulphite of sodium (cryst.)	1 ounce
Water	9 ounces

Let the plate to be intensified wash for at least half an hour, then lay in alum solution for ten minutes, and again wash thoroughly; this is to insure the perfect elimination of the hypo. The least trace of yellowness after intensifying shows that the washing was not sufficient.

Flow sufficient of No. 1 over the negative to cover it, and allow to either partially or entirely whiten; *the longer it is allowed to act* the *more intense* will be the result; pour off into the sink, then flow over No. 2, and allow to act one minute; wash off, and pour over or immerse in No. 3 until changed entirely to a dark brown or black. No. 3 can be returned to its bottle, but Nos. 1 and 2 had better be thrown away. Wash thoroughly and dry.

67.—Intensifier, with Mercury and Ammonia, for Gelatine Dry-Plates.

Pour over the well-washed negative a saturated solution of mercuric chloride (bichloride of mercury); do not keep it on too long, unless the negative is very thin. Wash well, and immerse in bath of

Water	10 ounces
Ammonia	10 minims

Leave the plate in this solution until the black color goes quite through the film. Wash well.

68.—Intensifier (Mercuric) with Sodium Sulphite, for Gelatine Dry-Plates.

Whiten the negative in the saturated solution of mercuric chloride, wash and blacken with a solution of sulphite of sodium 1 in 5. Wash well.

The reduction is perfect, with a positive black tone.

69.—Intensifier with Iodide of Mercury.

Dissolve 1 drachm of bichloride of mercury in 7 ounces of water and 3 drachms of iodide of potassium in 3 ounces of water, and pour the iodide solution into the mercury till the red precipitate formed is completely dissolved.

For use, dilute with water, flow over the negative till the proper density is reached, and wash, when the deposit will turn yellow. Remove the yellow color by flowing a 5 per cent. solution of hypo over the plate, and give it the final washing.

70.—Intensifier for Gelatine Dry-Plates with Mercuric Chloride and Hydrochinon (Dr. Mallman).

After whitening in the saturated solution of mercuric chloride, as usual, treat with an old hydrochinon developer; the result is a bluish-black intensification, which is applicable to positives as well as negatives.

71.—Intensifier, with Cyanide of Silver, for Gelatine Dry-Plates.

Mr. J. E. Thompson gives the following: After fixing and washing the plate well, place it in a solution of

Bichloride of mercury	10 gr.
Chloride of ammonium	10 gr.
Water	1 ounce

for a few seconds, until it bleaches. Then wash and place in a bath of cyanide of silver until it blackens, made as follows:

Cyanide of potassium	2 ounces
Distilled water	48 ounces
Nitrate of silver	1 ounce
Distilled water	6 ounces

Pour the silver solution gradually into that of the cyanide, stirring with a glass rod. The quantities given are about right to form a precipitate which will re-dissolve afterward. To be used when a few days old.

72.—Reducer for Gelatine Dry-Plate Negatives (Farmer's).

Sat. sol. of ferricyanide of potassium	1 part
Hyposulphite of sodium solution, 1 in 10	10 parts

73.—Reducer for Gelatine Dry-Plates.

Perchloride of iron	30 gr.
Citric acid	60 gr.
Water	1 pint

74.—Belitski's Acid Ferri-Oxalate Reducer for Gelatine Plates.

Water	7 ounces
Potassium ferric oxalate	2½ drachms
Crystallized neutral sulphite of sodium	2 drachms
Powdered oxalic acid, from	30 to 45 gr.
Hyposulphite of soda	1½ ounces

The solution must be made in this order, filtered, and be kept in tightly-closed bottles; and as under the influence of light the ferric salt is reduced to ferrous, the preparation must be kept in subdued light.

75.—To Reduce Intensity of Negatives.

Rub the parts to be reduced with a soft rag moistened with alcohol, till the density is softened down. For sharply defined outlines, use a pointed stick of soft wood dipped in alcohol.

The method may be well applied for the brightening up of flare spots and halation marks.

ORTHOCHROMATIC METHODS BY BATHING.

76.—Orthochromatic Dry-Plates—F. Ives' Chlorophyll and Eosine Process.

Use any good bromide collodion emulsion that contains no free nitrate of silver. Flow plate as usual, and as soon as the emulsion film sets, flow several times with strong alcoholic solution of chlorophyll from blue myrtle, or plantain leaves; then immerse in water strongly tinted with blue shade eosine, and keep in motion until smooth.

Sensitizes for all colors, including deep ruby red; a very light-yellow screen is sufficient to secure correct rendering of color-tone.

77.—Orthochromatic Dry-Plates—V. Schumann's Cyanine Bath.

Soak the plate in 200 C.c. of water and 2 to 4 C.c. of stronger ammonia for two or three minutes, then immerse in

Distilled water	200 C.c.
Alcohol	10 C.c.
Stronger ammonia (0.900)	4 C.c.
Alcoholic solution of cyanine, 1 in 500	10 C.c.

78.—Orthochromatic Dry-Plates—The Chautauqua Erythrosine Bath.

Preliminary Bath.

A.—Water	200 C.c.
Stronger ammonia	2 C.c.

Soak the plate for two minutes.

Color Bath.

Erythrosine solution, 1 in 1000	25 C.c.
Stronger ammonia (0.900)	4 C.c.
Water	175 C.c.

The plate should not remain longer in this bath than one and a quarter minutes.

79.—Obernetter's Method with Nitrate of Silver.

Distilled water	480	C.c.	= 16	fluid ounces
Nitrate of silver	1.25	Gr.	= 20	gr.
Ammonium carbonate	5	Gr.	= 75	gr.
Erythrosine solution (1 in 500)	35	C.c.	= 1⅛	fluid ounces
Stronger ammonia (0.900)	4	C.c.	= 1	drachm

Bathe the plate in the preliminary solution (see No. 78) for 150 seconds. Without washing flow the sensitizing solution over the plate twice, and dry in the dark closet.

80.—To Prepare Yellow Glass Screens.

Take of crushed (not powdered) curcuma root, 2 ounces, and macerate in 10 ounces of alcohol for three days. After filtering the tincture, mix with an equal bulk of ether, and add to each ounce of the mixture 6 grains of gun cotton.

With this collodion coat a plane parallel glass plate, which must be perfectly white, thin, and without any curvature.

VARNISHES.

81.—Negative Varnishes.

Sandarac	4 ounces
Alcohol	24 ounces
Oil of lavender	3 ounces
Chloroform	5 drachms

82.—Negative Varnish.

White hard varnish	15 ounces
Alcohol	25 ounces

This will be found a good and cheap varnish if durability is not required, as it is easily rubbed up for retouching upon and easily cleaned off. Very suitable for enlarged negatives that are not to be retained.

83.—Negative Varnish.

Tough, hard and durable.

Shellac	1¼ ounces
Mastic	¼ ounce
Oil of turpentine	¼ ounce
Sandarac	2¼ ounces
Venice turpentine	¼ ounce
Camphor	20 gr.
Alcohol	20 fluid ounces

84.—Negative Varnish.

Sandarac	90 ounces
Venice turpentine	36 ounces
Oil of lavender	10 ounces
Alcohol	500 fluid ounces

85.—Standard Photographic Varnish.

White shellac	8 ounces
Orange shellac	4 ounces
Sandarac	1 ounce
Alcohol	60 fluid ounces

86.—Retouching Medium.

Dammar	70 gr.
Yellow resin	6 drachms
Oil of turpentine	4 ounces

87.—Negative Retouching Varnish.

Sandarac	1 ounce
Castor oil	80 gr.
Alcohol	6 ounces

First dissolve the sandarac in the alcohol, and then add the oil.

88.—Ground-Glass Varnish.

Sandarac	90 gr.
Mastic	20 gr.
Ether	2 fluid ounces
Benzol	½ to 1½ fluid ounces

The proportion of the benzole added determines the nature of the mat obtained.

89.—Encaustic Paste.

Pure white wax	500 parts
Elemi	10 parts
Benzol	200 parts
Oil of lavender	300 parts
Oil of spike	15 parts

PRINTING AND TONING ON ALBUMENIZED, PLAIN AND OTHER PAPERS.

90.—The Silver Printing Bath.

Silver nitrate	50 gr.
Water	1 ounce

Neutralize with carbonate of silver.

91.—Modified Silver Bath.

Silver nitrate	50 gr.
Ammonium nitrate or magnesium nitrate	50 gr.

To secure a neutral state of the bath, a little carbonate of silver should be kept at the bottom of the stock bottle.

92.—THE PRICE TONING FORMULA.

Into 7½ ounces of water dissolve 15 grains chloride of gold and sodinm, then add to it 300 grains of acetate of soda and 7 drops of a saturated solution of chloride of lime.

This stock solution should be prepared at least twenty-four hours before being used. Take ½ ounce of it and mix with 5 ounces of water.

93.—THE PHOTOGRAPHIC TIMES TONING BATH.

Into 7½ ounces of water put 7½ grains chloride of gold and sodium. Label the bottle containing the mixture: *Chloride of gold solution*. Combine 6 ounces of water with 1 ounce *of French azotate*, to which add 1½ ounces of the chloride of gold solution.

94.—BORAX TONING BATH.

Chloride of gold solution, 1:50	3 C.c.
Borax solution, 1 to 10	100 C.c.
Water	100 C.c.

Can be used immediately.

95.—THE CHAUTAUQUA TONING BATH.

Dissolve 15 grains of chloride of gold and sodium in 15 ounces of water. Take of this solution 3 ounces, pour it in the toning tray, test for acidity with litmus paper, and *neutralize* with bicarbonate of soda, and add 30 grains of acetate of sodium and 30 ounces of water. Prepare the solution an hour before using it.

If warm tones are wanted, add a little acetic acid to the last washing water.

For this bath the sensitizing silver should be neutral, for which purpose a small portion of carbonate of silver should be kept in the silver stock bottle.

96.—CHARLES W. HEARN'S TONING BATHS.

With Sal Soda.

Distilled water	64 ounces
Acid sol. of chloride of gold (4 grains to 1 ounce)	1 ounce
Saturated solution of carbonate of sodium cryst.	½ ounce

Should be prepared half an hour before use.

With Chloride of Lime.

Water	40 ounces
Chloride of lime	5 gr.
Chloride of gold	4 gr.

97.—ABNEY AND ROBINSON'S TONING BATHS.

Chloride of gold	1 gr.
Sodium carbonate	10 gr.
Water	10 ounces

Should be used immediately after mixing. This bath gives purple and black tones.

98.—WITH CHALK AND CHLORIDE OF LIME.

Chloride of gold	2 gr.
Saturated sol. of chloride of lime	2 drops
Chalk	1 pinch
Water	16 ounces

The bath should be prepared with hot water, and be kept for one day before using it.

99.—Dr. Liesegang's Toning Bath.

With Tungstate of Sodium.

Tungstate of sodium	20 Gm.
Boiling water	1 liter
Chloride of gold	1 Gm.

100.—Dr. Liesegang's Toning Bath.

With Phosphate of Sodium.

Phosphate of sodium	15 Gm.
Chloride of gold	1 Gm.
Water	1 liter

101.—Dr. Liesegang's Toning Bath.

With Carbonate of Lime (Chalk).

Chloride of gold	1 Gm.
Carbonate of sodium	15 Gm.
Chalk	5 Gm.
Water	1 liter

After twelve hours the bath is perfectly clear and colorless, when it is ready for use. It is very durable, and gives fine tones.

102.—Toning Bath for Ready Sensitized Paper.

A.—Chloride of gold	1 Gm.
Water	1 liter
B.—Borax	10 Gm.
Tungstate of sodium	40 Gm.
Water	1 liter

103.—Printing on Plain Paper.

Prepare the plain paper with

Ammonium chloride	60 to 80 gr.
Sodium citrate	100 gr.
Sodium chloride	20 to 30 gr.
Gelatine	10 gr.
Distilled water	10 ounces

or,

Ammonium chloride	100 gr.
Gelatine	10 gr.
Water	10 ounces

The gelatine is first swelled in cold water and then dissolved in hot water, and the remaining components of the formula are added. The solution is filtered, and when still warm the paper floated upon it for three minutes.

The salted paper is sensitized upon a neutral 45-grain silver bath.

104.—Red Prints for Photo-Engravers.

Citric acid	100 gr.
Ammonium chloride	100 gr.
Gelatine	10 gr.
Water	10 ounces

Dissolve the citric acid in a small portion of water, and exactly neutralize with carbonate of soda (228 grains of common washing soda are required).

Float the paper on this bath for one to two minutes, and sensitize upon a 50-grain nitrate of silver solution. Fix in fresh hypo, without toning.

105.—Platinum Toning Bath, for Plain Silver Prints.

Chloroplatinite of potassium	1 Gm.
Water	1 liter
Nitric acid	5 to 10 drops

106.—Toning Silver Prints After Fixing (Pizzighelli).

Ammonium sulphocyanate	300 Gm.
Gold chloride	3 Gm.
Potassium hydrate	3 Gm.
Water	1000 Gm.

107.—How to Print on Whatman's Drawing Paper.

Salt the paper in

Water	560 Gm.
Arrowroot (boiled)	18 Gm.
Ammonium chloride	16 Gm.

by floating. Dry in horizontal position, and sensitize with a

Silver nitrate solution.....60 Gm. to 240 Gm. of water

to which

Citric acid.....25 Gm. in 240 Gm. of water

is added.

Print till a metallic lustre appears in the deeper shadows.

Tone with

Chloroplatinite of potassium	4 Gm.
Water	560 Gm.
Nitric acid	1 to 2 Gm.

Fix in the ordinary hypo bath made alkaline with a few drops of ammonia.

The resulting tones are of a warm brown, when, adding sodium bisulphite to the hypo, the color will turn to a positive black.

108.—Pizzighelli's Platinum Paper.

1.—Chloroplatinite of potassium	10 Gm.
Distilled water	60 Gm.
2.—Ferric oxalate	20 Gm.
Oxalic acid	1.5 Gm.
Water	100 Gm.
3.—2 per cent. solution of chlorate potassium	0.4 Gm.

For use, mix of

1	48 Gm.
2	30 Gm.
3	8 Gm.
Water	8 Gm.

The paper is coated with this solution by means of brusn, sponge or cotton tuft.

Dry quickly without the application of heat, and keep the sensitive paper in a box and free from moisture.

When sufficiently exposed, develop with

Oxalate potassium	140 Gm.
Water	500 Gm.

acidified slightly with oxalic acid.

Fix in 1 part of hydrochloric acid and from 60 to 80 of water; finally wash.

The acid fixing bath should be applied three or four times successively.

When adding to the above developer from 1 to 2 Gm. of mercuric chloride, the otherwise black tone will change to an agreeable brown.

ARISTOTYPE OR CHLORIDE OF SILVER COLLODION AND CHLORIDE OF SILVER GELATINE PRINTING

109.—Aristotype, or Chloride of Silver Collodion.

A.—Nitrate of silver	8 Gm.
Alcohol	100 C.c.
B.—Chloride of strontium	2 Gm.
Alcohol	100 C.c.
C.—Citric acid	5 Gm.
Water	100 C.c.
D.—Ether	100 C.c.
Gun cotton	4 Gm.
Alcohol	100 C.c.

To 100 C.c. collodion (D) add first, by constant agitation, 10 C.c. of B and 10 C.c. of C; finally add 5 C.c. of A by vigorously shaking the mixture. The resulting emulsion is allowed to settle for twenty-four hours, and is then used for coating paper.

110.—Chloride of Silver Collodion (Geldmacher's).

Solution 1.

Gun cotton	6½	fluid drachms
Ether	15	fluid ounces
Alcohol	15	fluid ounces
Castor oil	1	drachm

Solution 2.

Nitrate of silver	5 drachms	8 gr.
Water		6 drachms
Alcohol		1½ ounces

Dissolve in a warm water bath.

Solution 3.

Citric acid ..... 1 drachm 15 gr.

dissolved in

Alcohol ..... 2½ ounces

and

Chloride of strontium ..... 1 drachm 15 gr.

dissolved in

Alcohol ..... 2½ ounces

Make the two solutions separately and mix.

After all the solutions have been made, add No. 3 to No. 1, shake vigorously, and by subdued light add gradually, and in small portions at a time, the No. 2 solution by constant agitating.

After an hour's ripening, the collodion emulsion is ready for use.

The paper to be coated must be furnished with a substratum of sulphate of barium and gelatine.

111.—Woodbury's Formula for Gelatine Aristotypes.

Water	8	ounces
Silver nitrate	¼	ounce
Rochelle salts	20	gr.
Ammonium chloride	10	gr.
Alum	50	gr.
Citric acid	1	drachm
Gelatine	1	ounce

Dissolve the gelatine in 6 ounces of water, the silver nitrate and the citric acid in 1 ounce of water, and the salts and alum in another ounce of water; add latter solution to gelatine, and stir well and pour in the silver solution gradually.

112.—Liesegang's Toning Bath for Aristotypes.

A.—Water	20 ounces
Sulphocyanate of ammonium	1 ounce
Alum	1 ounce
Saturated solution of carbonate of ammonium	20 drops
B.—Water	50 ounces
Chloride of gold	15 gr.

113.—A. Stieglitz's Toning Bath for Aristotypes.

1.—Phosphate of sodium	3 drachms
Water	32 ounces
2.—Chloride of gold	15 gr.
Water	16 ounces

Mix. Allow to stand for twenty-four hours.

114.—Liesegang's Combined Toning Bath.

Water	32 ounces
Hyposulphite of sodium	8 ounces
Sulphocyanate of ammonium	1 ounce
Acetate of sodium	½ ounce
Saturated solution of alum	2 ounces

and

Water	8 ounces
Chloride of gold	15 gr.
Chloride of ammonium	30 gr.

Pour the gold solution into the hypo solution, then add 30 grains of freshly prepared chloride of silver.

115.—Combined Fixing and Toning Bath for Chloride of Silver Gelatine Paper.—Dr. F. Stolze's.

Hyposulphite of sodium	35 Gm.
Common salt	9 Gm.
Alum	4 Gm.
Sulphocyanate of ammonium	2 Gm.
Water	150 to 200 C.c.

The compound will have matured for use in four to eight days.

Decant the clear solution from the deposit formed and filter. Immediately before use, add to above quantity, 2 C.c. chloride of gold solution 1 in 100. If the solution does not act with sufficient energy, a few C.c. of saturated alum solution may be added.

116.—Bradfisch & Pierce Aristotype and Matt Surface Paper.

Gold Toning Bath.

Water	32 ounces
Bicarbonate of soda	20 gr.
Citrate of sodium	20 gr.

Dissolve and add a few drops of gold stock solution (1 grain to the ounce).

Use distilled water, if possible. Allow bath to stand one hour; then add 1 grain of gold in solution; place twenty-five to thirty prints in bath, and tone until the half tones and high lights are cleared, showing a bluish tint by transmitted light. Some of the red in the shadows must be left in the print, or the same will be overtoned. Never add gold when prints are in bath, or attempt to tone more than twenty-five or thirty prints in a batch. They should be kept under perfect control, and the amount of gold proportioned so as to tone in not less than seven or eight minutes. If prints are smoky, reduce the bicarbonate of soda to 25 grains. This bath can be used repeatedly by the addition of a small amount of bicar-

bonate of soda from time to time, and gold enough to tone; as soon as it becomes discolored, it should be thrown away. After toning, place prints in fresh water to which a little salt has been added; then rinse in one change of clear water, and place in following

Fixing and Hardening Bath.

Cold water	1 gallon
Hypo	6 ounces
"B. P." hardener	1 ounce

This bath can be used repeatedly until it becomes muddy. Fix from fifteen to twenty minutes.

117.—Bradfisch & Pierce Combined Toning and Fixing Bath.

Stock Solution A.

Water (cold)	1 gallon
Hypo	1 pound

Stock Solution B.

Water (cold)	15 ounces
Chloride of gold	15 gr.
Acetate of lead (crystals)	1 ounce

For Use.—Shake B well (do not filter), and add 6 ounces of B to half a gallon of A, stirring as added. Then add 2 ounces of "B. P." Hardener, and bath is ready for use.

For warm weather, mix fresh and cold before use; for cold weather, mix twenty-four hours before use.

118.—Bradfisch & Pierce N. Y. Aristotype Paper.

For Warm Sepia Tones.

Water	8 ounces
Solution A (15 grains gold to 8 ounces water)	½ ounce
Add bicarbonate of soda enough to make alkaline.	

This bath should be made up one hour before using.

For Purple Tones.

Water	8 ounces
Acetate soda	15 gr.
Solution A (15 grains gold to 8 ounces water)	½ ounce
Add bicarbonate of soda enough to make slightly alkaline.	

This bath should be made up one hour before using, and can be used repeatedly by the addition of gold solution as its action becomes slower.

For Brown Tones. No. 1.

Water	16 ounces
Borax	80 gr.
Tungstate soda	⅔ ounce
Add neutral gold enough to tone.	

No. 2.

Soak the prints in a saturated solution of camphor water for fifteen minutes, wash and tone in

Water	20 ounces
Phosphate soda	150 gr.
Add neutral gold enough to tone.	

Fixing Bath.

Water	20 ounces
Hypo	1 ounce
Common alum	1 ounce

119.—Kalona Aristo (a Collodio-Chloride Paper).

Any one of the following toning baths will be found to give good results.

No. 1.

Water	48 ounces
Acetate soda	75 gr.
Borax	75 gr.

Add neutral gold enough to tone.

No. 2.

Water	48 ounces
Phosphate soda	90 gr.

Add neutral gold enough to tone.

No. 3.

Water	48 ounces
Tungstate soda	150 gr.

Add neutral gold enough to tone.

Fixing Bath.

Hypo	3 ounces
Water	64 ounces

Fix not less than fifteen minutes, keeping prints in constant motion. After prints are taken from fixing bath, a thorough rinsing in four or five changes of water is necessary to remove the excess of hypo before placing in trays or tanks for final washing.

The complete elimination of hypo from the prints is absolutely necessary, for any of it remaining causes discoloration.

120.—C. E. Hopkins's Omega Papers.

Separate Toning and Fixing for Omega Paper.—Print about the same as albumen paper. Wash through five or six changes of water, having the first two thoroughly alkali.

Have prepared the following solutions :

Borax (saturated solution)	1 to 12	ounces water
Acetate of soda (saturated solution)	1 to 3	ounces water
Hypo soda (saturated solution	1 to 1½	ounces water
Alum (saturated solution)	1 to 10	ounces water

For toning, use gold solution, 1 ounce ; water 20 to 60 ounces ; borax solution, to make nearly neutral ; acetate of soda solution, 2 to 4 drachms.

Tone to nearly the desired tone, and place in plenty of water slightly acidified with acetic acid ; rinse well, and fix from fifteen to thirty minutes in hypo solution, 9 to 12 ounces ; borax solution, 3 to 6 ounces ; liquid acid sulphite of soda, 1 drachm ; alum solution, 10 to 20 ounces ; water to make 1 gallon. The acid sulphite, added before the alum, prevents any precipitation. Time the fixing according to the depth of printing, tone, etc. If the high lights are clear and the print light enough, and the tone not too warm, take out in fifteen minutes ; otherwise, leave in longer and strengthen the bath. The strength of the toning bath should be regulated to suit the strength of the paper, fresh paper toning much easier than old. Toning should occupy about ten minutes, and strength of bath regulated to that time.

Handle prints face down in all of the processes, and keep them moving ; wash very thoroughly after fixing ; mount, retouch and burnish in the ordinary way. For cleaning the surface of the prints after they are dry, use alcohol and a soft, clean cloth. In cool weather, and prints in ordinary condition, the smaller quantities indicated in the formula are sufficient ; but more alum may be required in warm weather, in which case use more borax and hypo also. In case the high lights do not clear up in a reasonable time, the fixing bath should be strengthened.

Combined Bath for Omega Paper.

Hot water	1 gallon
Hypo soda	12 ounces
Borax	1 ounce
Alum	4 ounces

Dissolve thoroughly; place in evaporating dish; heat to near the boiling point (180 degs.); let cool, and filter. For use, to each 32 ounces add 1 drachm of an 8-grain solution acetate of lead, and 1 grain of gold. This ought to tone in about ten to fifteen minutes. If it should tone more rapidly than ten, add more of the stock solution; but if more slowly than fifteen, add a little more gold. Do not wash the prints previous to toning, but place them dry into the bath, one at a time, being careful to manipulate them briskly, and break all air bubbles. Do not place too many prints in the bath at once, and do not try to tone too many in a given quantity of solution. One quart of the bath will tone and fix from forty to fifty cabinets. Do not try more. Throw this away and use fresh. Should the film become soft, rinse through two or three changes of water, and soak them a few minutes in a plain bath of alum, about 4 ounces to the gallon. It is surprising what beautiful tones may be produced by this process—no indication of that "double tone" so common in combined baths. Stop the tone very nearly where you want it, as there is very little change in drying. If there is any inclination to stick to the rubbing-down paper, use a soft, wet sponge.

121.—Chautauqua (Ehrmann's) Combined Toning and Fixing Bath.

Dissolve

Hyposulphite of soda	16 ounces

in

Water	31 ounces

Also dissolve

Alum	3 ounces

in

Water	31 ounces

Mix the two solutions and allow to stand for several days in an open jar or vessel till all sulphurous acid has evaporated. Then filter, and add 22 grains of nitrate of lead previously dissolved in water.

To 18 ounces of this solution add 5 grains of pure terchloride of gold dissolved in 2 ounces of water.

The gold solution should be added in small portions at a time, by constant stirring with a glass rod.

Twenty ounces of this bath will tone fifty 5 x 8s of any kind of aristo (chloride of silver emulsion) prints, but not more.

The best results were had upon Bradfisch Improved Aristo Paper.

PRINTING ON SUBSTANCES OTHER THAN PAPER.

122.—Collodion for Porcelain Pictures.

Fennemore's Method.

A.—Negative gun cotton	60 gr.
Alcohol	2 ounces
Ether	3 ounces

Dissolve 120 grains nitrate of silver in 3 ounces of hot alcohol, and add by constant stirring to the above collodion.

B.—Chloride of strontium	32 gr.
Citric acid	24 gr.

Reduce to a fine powder and dissolve in 4 ounces of alcohol, add

Ether	4 ounces
Gun cotton	60 gr.

The two collodions are to be mixed in equal proportions.

123. *Hern's Method.*

A.—Alcohol	7 ounces
Ether	9 ounces
Gun cotton	112 gr.
B.—Nitrate of silver	186 gr.
Distilled water	1 ounce
C.—Chloride of calcium	128 gr.
Alcohol	4 ounces
D.—Citric acid	128 gr.
Alcohol	4 ounces

Decant 8 ounces of A, add 64 drops of B in small portions, stirring up well after every addition, and 4 drachms of C in the same way. Finally 4 drachms of D must be added in the same manner as the calcium solution.

124.—Printing on Silk.

Boiling water	80 ounces
Chloride of ammonium	100 gr.
Iceland moss	60 gr.

When nearly cold, filter and immerse the silk for fifteen minutes. Sensitize for fifteen minutes in an acid 20-grain silver bath, and when dry stretch the fabric over cardboard. Print deeper than usual and tone in

Water	20 ounces
Acetate of sodium	2 drachms
Chloride of gold	3 gr.
Common whiting	a few gr.

125.—Making Silver Prints on Wood.

Gelatine	45 gr.
White soap	45 gr.
Water	5¼ fluid ounces

Soak the gelatine in water for five or six hours, then dissolve it with the aid of a water bath. Cut the soap into small pieces, and add to the gelatine solution, stirring the whole with a glass rod to insure a perfect mixture; then add powdered alum until the froth disappears, and strain through muslin. Cover the block with this mixture and a little zinc white, then wipe off so that a very thin film will be left, rubbing it gently, so that the film may be of as even a thickness as possible. After drying, apply with a badger's-hair brush a coating of the following composition:

Albumen	3¼ fluid ounces
Water	2½ fluid ounces
Chloride of ammonium	67½ gr.
Citric acid	18¾ gr.

Whip the albumen to a froth, and allow it to settle; to the limpid portion add the water, then the sal ammonia, and carefully stir with a glass rod. then add the citric acid. When the block is dry, sensitize with a solution of

Nitrate of silver	187½ gr.
Water	3¼ fluid ounces

Pour this upon the surface of the block, spread it evenly with a glass rod and pour off the excess. When the block is dry, expose it under a negative in the usual manner, until it is printed the exact shade desired. When printed, immerse the printed surface in a very strong solution of salt for about three minutes. Then wash it under a stream of water for a short time, and fix it by placing it face downward in a saturated solution of hyposulphite of soda. After fixing, wash under a stream of water for about ten minutes; when dry, it is finished, and ready for the engraver.

126.—To Transfer Photographs upon Wood for Engraving.

Float the reverse side of sensitized albumen paper for fifteen minutes upon a 4 per cent. solution of bichromate of potassium; dry well; expose to light till the picture is fairly visible; place the print upon a glass plate under water until the unacted on bichromate is dissolved out; after removal from the water, roll in with fatty ink.

When the picture is sufficiently blackened, and nearly dry, it can be transferred upon the engraver's block by rubbing it on carefully.

PRINTING WITH THE SALTS OF IRON.

127.—Cyanotypes or Blue Prints.

A.—Citrate of iron and ammonium	1⅞ ounces
Water	8 ounces
B.—Ferricyanide of potassium	1¼ ounces
Water	8 ounces

Mix equal parts immediately before use and float the paper, Rives' plain, upon it for three minutes; hang up to dry.

To Intensify Faint Blue Prints.—Soak them for five minutes in a solution of 1 drachm of ferric chloride in 32 ounces of water, and wash again.

128.—Eastman's Permanent Bromide Paper.

No. 1.

Oxalate of potash	1 pound
Hot water	48 ounces
Acetic acid	3 drachms

No. 2.

Proto-sulphate of iron	1 pound
Hot water	32 ounces
Acetic acid (or citric acid, ¼ ounce)	½ drachm

No. 3.

Bromide potassium	1 ounce
Water	1 quart

These solutions keep separately, but must be mixed only for immediate use.

To Develop.—Take in a suitable tray—

No. 1	6 ounces
No. 2	1 ounce
No. 3	½ drachm

Mix in the order given; use cold. After exposure, soak the paper in water until limp; then immerse in the developer.

The image should appear slowly, and should develop up *strong, clear and brilliant.* When the shadows are sufficiently black, pour off the developer and flood the print with the

Clearing Solution.

Acetic acid	1 drachm
Water	32 ounces

Do not wash the print after pouring off the developer and before applying the clearing solution.

Use a sufficient quantity to flow over the print, say, 2 ounces for an 8 x 10. Allow it to act for one minute, and then pour it off and apply a fresh portion; repeat the operation a third time, then rinse in pure water and immerse for ten minutes in the

Fixing Bath.

Hyposulphite of soda	3 ounces
Water	16 ounces

After fixing, wash thoroughly *two hours* and hang up to dry. Use fresh developer for each batch of prints. With a glass bottomed tray 7 ounces of developer are sufficient for a 25 x 30 print.

129.—Eastman's Enameled Bromide Paper

Is developed as above.

130.—To Tone Bromide of Silver Prints and Diapositives to a Warm Color.

A.—Uranium nitrate	1 Gm.
Water	100 Gm.
B.—Potassium ferricyanate	2 Gm.
Glacial acetic acid	8 Gm.
Water	100 Gm.

Mix immediately before use.

131.—Kallitype Printing (Formula No. 2).

Dissolve 15 Gm. of ferric oxalate in 500 C.c. of water, and 3 Gm. of silver nitrate in 500 C.c. of water. Mix the two solutions, and float the paper upon it for two minutes.

Print till the half shadows of the cliché are out, and develop in

Water	1000 Gm.
Rochelle salts	10 Gm.
Borax	7 Gm.
And of a saturated solution of potassium bichromate from 2 to	4 drops

The picture is thoroughly developed in fifteen minutes; afterward immerse it in diluted ammonia, 1 : 100; wash and dry.

Potassium bichromate acts here as a restrainer. Too much of it makes the print harsh and chalky, and a longer exposure is required to make a good print.

132.—The Kallitype (*The Photographic Times* Formula).

Coat stout but fine grained paper with a solution of

Sodium ferric-oxalate	6 drachms
Water	2½ ounces

Dry quickly without the application of heat, and print till the deeper shadow portions of the picture become visible. On removal of the print from the frame, immerse into a 1½ per cent. solution of nitrate of silver acidified slightly with citric acid, when the picture will develop brilliantly and with all detail.

Finally wash in pure water. A yellow tinge may be washed away with a 5 per cent. solution of oxalic acid.

133.—Formula for Vici (Kallitype) Paper, Hopkins's.

Use this paper when thoroughly dry. Do not print in rainy weather expecting superior results, nor after 4 P.M. expecting black tones. This paper prints but slightly; developing is done afterward.

Print in direct sunlight until deep shadows are well indicated.

Developing may be done in weak white light.

As with Omega paper, the prints when finished will be of a darker color than they appear in the developer. There is no chance in overdeveloping, care only being required in the printing. Do not expose prints in too strong white light until after having taken out of the fixing solution.

Immerse prints one at a time in either of the following solutions,

breaking any air bubbles that may appear, until the yellow of the paper entirely disappears. This takes about five minutes.

Develop as soon as possible after removing from printing frame, as they continue to print after once exposed.

Black Tones.

Water	10 ounces
Rochelle salts	1 ounce
Borax	¾ ounce

Sepia Tones.

Water	10 ounces
Rochelle salts	1 ounce
Borax	2 drachms

Dissolve cold, shake well, leave any undissolved borax in bottle, and filter.

Restraining Solution.

Bichromate of potash	20 gr.
Water	10 ounces

15 to 20 minims must be added to 10 ounces of mixed developer.

Increasing the amount of this solution in the developer adds brilliancy to the prints, and prevents flatness. Increase it for feeble negatives, decrease it for intense; excess will totally destroy half tone. As prints are taken from the developing solution, place them in clear water. When prints are all developed, remove them from the water to the fixing bath, as follows:

Water	32 ounces
Ammonia	2 drachms

Leave the prints in this bath for ten minutes, or two baths for five minutes each for large quantities.

Wash for twenty minutes, mount and dry. Prints when finished may be toned with platinum in the following bath:

Water	20 ounces
Platinum potash chloride	15 gr.
Citric acid	5 gr.

134.—Converting Blue Prints into Brown Prints.

Blue ferro-prussiate photographic prints may be converted into brown prints by the following process:

The positive blue print, thoroughly washed and dried, is plunged into a solution of ammonia, in which it is kept until it has nearly or entirely lost its color. (The operation lasts from two to four minutes.) The print is rinsed and plunged into a bath of tannic acid, the operation being stopped as soon as the desired sharpness and tone are obtained.

This last operation requires about ten minutes. If at the end of this time the color be not dark enough, it is intensified by adding to the bath a few drops of ammonia. After a lapse of one or two minutes, rinse in abundant water.

1. Solution for preparing the sensitized paper:

Tartrate of iron and potassium	15 Gm.
Red prussiate of potash	12 Gm.
Rain water	250 C.c.

2. Solution to remove the color of the print:

Stronger ammonia (0.900)	100 C.c.
Rain water	800 C.c.

3. Solution to give the brown tone:

Tannic acid	10 Gm.
Rain water	500 C.c.

Dissolve and filter.

135.—Toning Blue Prints.

Blue prints may be given the black tone by plunging them into a solution of 4 parts of potash in 100 parts of water; then, when the blue color has entirely disappeared under the action of the potash, and a yellowish color has taken its place, they are immersed in a solution of 4 parts of tannin in 100 parts of water; then, washing them again, we obtain prints whose tone may be assimilated to that of pale writing ink.

136.—Pellett's Method for Making Blue Lines upon White Ground.

The formula is composed as follows:

Gum arabic	385	gr.
Sodium chloride	46	gr.
Tartaric acid	62	gr.
Perchloride of iron	123	gr.
Water	3½	ounces

Highly sized and smooth paper is evenly coated with this mixture, dried in the dark, and exposed under a negative.

Develop with a saturated solution of ferrocyanide of potassium. Fix in a 1 to 20 solution of hydrochloric acid.

137.—Black Lines upon White Ground.

Water	9 ounces
Gelatine	3 drachms
Solution of perchloride of iron (U. S. Ph.)	6 drachms
Tartaric acid	3 drachms
Ferric sulphate	3 drachms

Dissolve, filter and apply to the surface of stout paper (Steinbach medium roll).

After exposure to light, under a diapositive or drawing, immerse the print in

Gallic acid	6	drachms
Alcohol	6½	ounces
Water	32	ounces

when the greenish-yellow print will turn to inky black.

Finally wash in pure water.

USEFUL RECEIPTS.

138.—To Find the Focal Length of a Lens—W. H. Sherman's Rule.

Make two images of any object of convenient length, so that the *difference* between the images will be equal to some part of the object, making the position of the ground-glass on the base of the camera where each image is in focus. The distance between the two positions of the ground-glass thus found will be the same part of the focal length that the difference of the two images is of the object.

Examples: With two images of a foot-rule, let one image be 8 inches long and the other 4 inches. The difference being one-third the length of the object, the distance between the two positions of the ground glass will be one-third of the focal length of the lens.

139.—To Calculate the Focal Fraction of Stops for Lenses.

Divide the focal length obtained by the above method expressed in inches and hundredths, by the diameter of stop opening expressed in hundredths of an inch.

140.—Labarraque's Solution.

Chloride of lime	2 ounces
Carbonate of sodium, cryst	4 ounces
Water	40 ounces

Mix the chloride of lime with 30 ounces of the water; and dissolve the carbonate of soda in the remainder. Mix, boil and filter.

141.—Eau de Javelle.

Dry chloride of lime	2 ounces
Carbonate of potash	4 ounces
Water	40 ounces

Mix the chloride of lime with half of the water; dissolve the carbonate of potash in the remainder. Mix, boil and filter.

142.—A Few Remedies Against Blistering of Albumen Paper.

Do not dry the paper by excessive heat.
Avoid acidity in solutions.
Moisten the print before washing with a sponge saturated in alcohol.
Immerse the print before fixing in a weak alum.
Add a trace of aqua ammonia to the fixing bath.
Add one-tenth part of alcohol to the ordinary toning bath.

143.—Mat Black Varnish.

A tolerably strong solution of sandarac in alcohol, mixed with fine lampblack, dries without gloss, becomes hard without being brittle, and may be applied with a fine brush upon almost any substance.

144.—Invisible Ink.

Chloride of cobalt	50 gr.
Distilled water	1 fluid ounce
Glycerine	10 minims

Dissolve the chloride of cobalt in the distilled water, and add the glycerine.

Writing executed with this ink is invisible on paper, but on warming the writing turns blue. On exposure to damp air it becomes invisible again.

145.—Solution for Making Paper Adhere to Metal.

Tragacanth	30 Gm.
Gum arabic	120 Gm.
Water	500 C.c.

146.—To Precipitate Gold from Spent Sulphocyanate Toning Baths.

Add sulphuric acid and heat, when the gold will separate.

147.—To Keep Unmounted Albumen Prints Flat.

Soak them in equal parts of alcohol, glycerine and water; dry between blotting paper under slight pressure.

148.—Magic Photographs.

Fix an albumen print in perfectly fresh hypo solution and wash well, and soak it in a solution of 1 part bichloride of mercury, ¼ of a part of chloride of ammonium in 60 parts of water, till the photograph is bleached out.

The picture will appear again when brought into contact with hypo solution, or moistened blotting paper previously prepared with the fixing soda.

149.—Solution for Mounting Prints Without Their Cockling.

Nelson's No. 1 photographic gelatine	4 ounces
Water	16 ounces
Glycerine	1 ounce
Alcohol	5 ounces

Dissolve the gelatine in the water, then add the glycerine, and lastly the alcohol.

150.—Permanent Paste.

Arrowroot	10 Gm.
Water	100 Gm.

in which 1 gramme of gelatine has been soaked, and boil. After cooling add 10 grammes of alcohol and a few drops of carbolic acid.

151.—Leather Collodion.

2 p. c. collodion	100 parts
Castor oil	4 parts

152.—Lubricator for Hot Burnishing.

Spermaceti	10 Gm.
Castile soap	10 Gm.
Alcohol	1 liter

153.—To Remove Silver Stains from the Hands.

Sulphate of sodium (Glauber's salt)	½ ounce
Chloride of lime	¼ ounce
Water	1 ounce

Mix thoroughly, and apply with an old toothbrush.

154.—To Frost a Skylight.

Very thin starch paste, to which unboiled starch has been added. Must be free from lumps, and be daubed on with a large bristle brush.

155.—To Keep the Hands Soft and White.

Apply before retiring:

Glycerine	2 ounces
Bay rum	6 ounces
Oil cajeput	1 drachm
Oil bergamot	1 drachm

Mix well.

156.—To Remove Nitric Acid Stains from Hands or Garments.

Touch the stains with solution of permanganate of potassium; wash, rinse in dilute hydrochloric acid, and wash again.

157.—To Remove Yellow Stains from Bromide Prints.

Soak for one or two hours in

Acetic acid	2 ounces
Saturated oxalate of potassium solution	4 ounces

158.—To Remove Pyro Stains from Fingers.

Wash with a 10 per cent. solution of oxalic acid, or sulphuric acid, diluted with water, 1 : 20.

159.—To Remove Yellow Stains from Pyro Developed Negatives.

Bathe them in sulphurous acid water or in a 10 per cent. solution of sulphite of soda, to which a few drops of sulphuric acid has been added.

160.—To Remove the Odor of Hydrosulphate of Ammonium from the Dark Room.

Sprinkle the floor with a solution of nitrate of lead.

161.—To Avoid Halation.

A quick drying coating, which is applied to the back of the plate, consists of collodion, with which any dark red or brown pigment is mixed. Spanish brown or rouge answers well.

162.—To Recover Silver Bromide from Waste Emulsion.

Let the emulsion be melted, and then add a small quantity of hydrochloric acid, following by boiling for two or three minutes. The silver bromide precipitates, and the destroyed gelatine is then poured off. The bromide is then placed among the other residues for reduction.

163.—Toning Bath for Gelatine Lantern Slides.

Chloride of platinum	1 gr.
Hydrochloric acid	1 minim
Water	32 ounces

164.—Compound for Blocking Out Large Portions of a Negative.

Mix asphaltum varnish with fine lamp-black, and apply with a camel's-hair brush.

Should be kept in well-stoppered bottles.

165.—Flash-Light Powder for Orthochromatic Plates.

Pure metallic magnesium powder	10 gr.
Nitrate of sodium (finely powdered)	from 50 to 70 gr.

166.—Largest and Smallest Quantities of Chemicals Admitted to the Pyro Developer.

	Largest.	Smallest.
Pyro, per ounce	10 gr.	1¼ gr.
Sulphite of sodium	80 gr.	5 gr.
Carb. of sodium	40 gr.	1 1-5 gr.
Carb. of potassium	21 2-10 gr.	5 gr.

167.—Consumption of Chemicals in Silver Printing on Albumenized Paper.

Of 100 parts of silver used in the albumen printing process will be found

In the finished print	3 per cent
In filters, blottings and cuttings	7 per cent
In the wash water before toning	50 to 55 per cent
In the fixing bath	30 to 35 per cent
In the wash water after fixing	5 per cent

90 per cent. of the silver used may be recovered.

One sheet of paper, 18 x 22, will take from the silver bath from 30 to 45 grains of nitrate of silver.

One sheet of paper, 18 x 22, requires to tone 1½ grains of gold (1 decigram).

About 80 to 90 grains of hyposulphite of sodium are necessary to fix one sheet of paper, 18 x 22.

TABLE SHOWING COMPARATIVE VALUE OF ALKALINE CARBONATES IN DEVELOPERS. By O. G. Mason.

Commercial Name.	Chemical Symbol.	Molecular Weight.	The Commercial Salt contains of the pure Salt about	100 parts of 36 per cent Acetic Acid Require for Saturation.	Solubility in Water (approximate).
Soda, Caustic	$NaHO$	40	80 to 92%	26.66 parts of 90% Soda	1 part in 2
Sodium Carbonate, Carbonate of Soda, Sal Soda, Crystals,	$Na_2CO_3.10H_2O$	286	96 to 98%	89.38 " 96% "	1 " 2
The same, anhydrous or in dry powder	Na_2CO_3	106	About 98 to 99%	89.38 of 98 to 99% dry Sal Soda.	1 " 6
Sodium Bicarbonate, Bicarbonate of Soda, "Sesqui-carbonate of Soda."	$NaHCO_3$	84	98 to 100%	50.91 of 99% Bicarb. Soda.	1 " 12

Equal work is done by 60 parts of Caustic Soda, 286 parts of Sal Soda (crystals), 106 parts of Sal Soda (dry), 168 parts of Bicarbonate of Soda. These quantities must be increased to make up for any impurity contained in the sample being used; for this purpose the usual percentage of impurity given in the above table may be assumed for all ordinary photographical uses.

Potassa (Caustic Potash)	KHO	56	80 to 95%	37.33 parts of 90% Potassa.	1 part in 1
Potassium Carbonate, Carbonate of Potassa, Sal Tartar, Saleratus,	$K_2CO_3.1\frac{1}{2}H_2O$	165	76 to 96% Usually about 81%	51.11 parts of 81% Carb. Potassa.	1 " 1
Potassium, Carbonate, dry	K_2CO_3	140	About 95%	122.74 parts of 95% Carb Potassa.	1 " 1
Potassium Bicarbonate, Bicarbonate of Potassa,	$KHCO_3$	100	100%	60 parts of 100% Bicarb. Potassa.	1 " 4

Equal work is done by 112 parts Caustic Potassa, 165 parts (about) ordinary Carbonate Potassa, 200 parts of Bicarbonate Potassa. These quantities must be increased in proportion to impurities, as noted in case of Soda. These two alkalies are interchangeable for doing the same amount of work when *pure*, and when the one named in a given formula can not be obtained the table may assist in choosing a substitute of proper strength and solubility.

Dry or anhydrous Carbonate of Potassium is not usually found in the market.

TABLE OF THE SYMBOLS, ATOMICITY, ATOMIC AND EQUIVALENT WEIGHTS OF THE ELEMENTS.

Name.	Symbol.	Atomicity.	Atomic Weight.	Equivalent Weight.
Aluminum	Al	iii (iv)	27.5	13.7
Antimony (Stibium)	Sb	iii (v)	122.0	122.0
Arsen	As	iii (v)	75.0	75.0
Barium	Ba	ii	137.0	68.5
Beryllium (Glucinum)	Be	ii or iii	9.4	4.7
Bismuth	Bi	iii (v)	208.0	208 0
Boron	Bo	iii (v)	11.0	11.0
Bromine	Br	i (iii, v, vii)	80.0	80.0
Carbon	C	iv	12.0	6.0
Cadmium	Cd	ii	112.0	56.0
Caesium	Cs	i	133.0	133.0
Calcium	Ca	ii	40 0	20.0
Cerium	Ce	iii (iv)	138.0	46.0
Chlorine	Cl	i (iii, v, vii)	35.5	35.5
Chromium	Cr	iv (vi)	52.2	26.1
Cobalt	Co	ii (iv)	58.8	29.4
Copper	Cu	ii	63.4	31.7
Didymium	Di	iii	145.0	
Erbium	E	iii	169.0	
Fluorine	F	i	19.0	19.0
Gallium	Ga	iv	68.0	
Germanium	Ge	iv	72.2	
Glucinum	G	ii	9.4	4.7
Gold	Au	i (iii)	196.0	196.0
Hydrogen	H	i	1.0	1.0
Indium	In	iii (iv?)	113.4	37.8
Iodine	I	i, iii, v, vii	127.0	127.0
Iridium	Ir	ii (iv, vi)	198.0	99.0
Iron	Fe	ii (iv, vi)	56.0	28.0
Lanthanium	La	iii	139.0	46.3
Lead (Plumbum)	Pb	ii (iv)	207.0	103 5
Lithium	Li	i	7.0	7.0
Magnesium	Mg	ii	24 0	12.0
Manganese	Mn	ii (iv, vi, vii)	55.0	27.5
Mercury	Hg	ii	200.0	100.0
Molybdenum	Mo	vi	96.0	46.0

TABLE OF THE SYMBOLS, ETC.—(*Continued.*)

Name.	Symbol.	Atomicity.	Atomic Weight.	Equivalent Weight.
Niobium (Columbium)	Nb	v	94.0	18.8
Nickel	Ni	ii (iv)	58.8	29.4
Nitrogen	N	iii (v)	14.0	14.0
Osmium	Os	ii (iv, vi, viii)	199.0	99.5
Oxygen	O	ii (iv ?)	16.0	8.0
Palladium	Pd	(ii, iv, vi)	106.6	53.25
Phosphorus	P	iii (v)	31.0	31.0
Platinum	Pt	ii (iv, vi)	197.4	98.7
Potassium (Kalium)	K	i	39.0	39.0
Rhodium	Rh	ii (vi)	104.4	52.2
Rubidium	Rb	i (v)	85.4	85.4
Ruthenium	Ru	ii (iv, vi, viii)	104.4	52.2
Scandium	Sc	ii (iv, vi, viii)	43.9	52.2
Selenium	Se	ii (iv, vi)	79.4	39.7
Silicon (Silicium)	Si	iv	28.0	14.0
Silver (Argentum)	Ag	i	108.0	108.0
Sodium (Natrium)	Na	i	23.0	23.0
Strontium	Sr	ii	87.5	43.7
Sulphur	S	ii (iv, vi)	32.0	16.0
Tantalum	Ta	v	182.0	36.4
Tellurium	Te	ii (iv, vi)	127.0	64.0
Thallium	Tl	i (iii)	204.0	204.0
Thorium	Th	iv	231.5	57.87
Tin (Stannum)	Sn	ii, iv	118.0	59.0
Tungsten (Wolfram)	W	iv, vi	184.0	92.0
Uranium	U	vi (iv)	240.0	60.0
Vanadium	V	iii (v)	51.2	51.2
Ytterbium	Yt	iv	172.6	17.1
Yttrium	Y	ii	61.7	30.85
Zinc	Zn	ii	65.0	32.5
Zirconium	Zr	iv	90.0	44.8

TABLE OF SYMBOLS, ATOMIC WEIGHT AND SOLUBILITIES OF THE PRINCIPAL CHEMICALS USED IN PHOTOGRAPHY.

Abbreviations.—s., soluble; v. s., very soluble; sp. s., sparingly soluble; n. s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Atomic Weight.	One Part is Soluble in Cold Water.	One Part is Soluble in Hot Water.	Alcohol.
Acid, Acetic	$C_2H_4O_2$	60	in any proportion.		
" Boric or Boracic	H_3BO_3	62	25	3	6
" Carbolic (see Phenol)	C_6H_6O	94	16.6	3	6
" Citric	$C_6H_8O_7+H_2O$	210	0.75	0.5	s.
" Digallic (see Tannin)	$C_{27}H_{22}O_{17}$	618	0.8	0.5	0.8
" Gallic	$C_7H_6O_5+H_2O$	188	100	3	8
" Hydrobromic	HBr	81	s.	s.	s.
" Hydroiodic	HI	128	s.	s.	s.
" Hydrochloric	$HCl+7H_2O$	36.5	s.	s.	s.
" Hydrofluoric	$HFl+3H_2O$	74	s.	s.	s.
" Hydrocyanic	HCy	27	s.	s.	s.
" Hydrosulphuric	H_2S	34	s.	s.	s.
" Muriatic (see Hydrochloric)					
" Nitric	HNO_3	63	in all proportions.		
" Nitrous	HNO_2	47	absorbed.		
" Oxalic	$C_2H_2O_4+2H_2O$	126	8	0.2	s. also in ether
" Pyrogallic (see Pyrogallol)	$C_6H_6O_3$	126	2	v. s.	also v. s. in ether.
" Salicylic	$C_7H_6O_3$	138	7.6	9	also v. s. in ether.
" Sulphuric	H_2SO_4	98	in all proportions.		
" Sulphurous	H_2SO_3	82	absorbed.		
" Tannic (see Digallic)					
" Tartaric	$C_4H_6O_4$	150	0.8	0.5	5
Alcohol, Ethyl	C_2H_6O	46	in all proportions.		

Alcohol, Methyl (see Wood Alcohol)	CH_4O	32	in	all propor	tions.
Alum (see Potassium Aluminium Sulphate)	$Al_2(SO_4)_3K_2SO_4 24H_2O$	948	10	8	n. s.
Alum Chrome (see Potassium Chromic Sulph.)	$Cr_2(SO_4)_3K_2SO_4 24H_2O$	999	10	dec.	n. s.
Amidol (Diamido Phenol)	$C_6H_8N_2O$	124	very	soluble.	.....
Ammonia, Gaseous	NH_3	17	very	soluble.	.....
Ammonium Bichromate	$(NH_4)_2Cr_2O_7$	252	v. s.	v. s.	.....
" Bromide	NH_4Br	98	1.29	0.7	31.5
" Cadmium Bromide	$2NH_4Br?CdBr_2+H_2O$	584	0.73	.....	5.3
" " Iodide	$2NH_4ICdI_2+2H_2O$	692	0.58	.....	0.70
" Chloride	NH_4Cl	53.5	3	1	sp. s.
" Ferric Oxalate	$Fe_2(C_2O_4)_6(NH_4)_6+8H_2O$	892	2.10	0.29	sp. s.
" Fluoride	NH_4Fl	37	v. s.	v. s.	sp. s.
" Iodide	NH_4I	145	1	0.5	s.
" Nitrate	NH_4NO_3	80	2	1	s.
" Oxalate	$(NH_4)_2C_2O_4$	124	4	2	s.
" Sulphide	NH_4HS	51	v. s.	v. s.	o. s.
" Sulpho-Cyanate	NH_4CNS	76	s.	s.	s.
Aurantia (Hexanitro-diphenylamin Ammonia)	$C_{12}H_4(NO_2)_6N,NH_4$	456	.....	.....	.....
Aurin (Trioxy-triphenyl-Carbinol)	$C_{19}H_{14}O_3$	290	.....	.....	.....
Barium Chloride	$BaCl_2+2H_2O$	345	2 18	1.5	sp. s.
" Nitrate	$Ba(NO_3)$	261	12.2	2.84	n. s.
" Per-oxide	BaO_2	169	v. s.	n. s.	n. s.
Benzole or Benzine (Trioxy-triphenyl-Carbinol)	C_6H_6	78	n. s.	n. s.	s.
Borax (see Sodium Biborate)	.....	.....	.....	.....	.....
Cadmium Bromide	$CdBr_2+4H_2O$	344	1.5	1	sp. s.
" Iodide	CdI_2	366	1 5	1	s.
Calcium Bromide	$CaBr_2+4H_2O$	272	1	.75	s.
" Carbonate (see Chalk)	$CaCO_3$	100	n. s.	n. s.	n. s.
" Chloride	$CaCl_2$	111	.75	.5	10.
" Hypochlorite (see Chloride of Lime)	$CaCl_2O_2CaCl_2(?)$	254	sp. s.	sp. s.	dec.
Calomel (see Mercurous Chloride)	.....	.....	.....	.....	.....
Camphor	$C_{10}H_{16}O$	152	1000	.....	v. s.
Caustic Potash (see Potassium Hydrate)	.....	.....	.....	.....	.....
" Soda (see Sodium Hydrate)	.....	.....	.....	.....	.....
Chalk (see Calcium Carbonate)	.....	.....	.....	.....	.....

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Abbreviations.—s., soluble; v. s., very soluble; sp. s., sparingly soluble; n. s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Atomic Weight.	One Part is Soluble in Cold Water.	One Part is Soluble in Hot Water.	Alcohol.
Chinoline Blue or Cyanine	$C_{29}H_{35}NaI$	538	sp. s.	sp. s.	s.
" Red	$C_{26}H_{19}NaCl$	394.5			
Chloride of Lime (see Calcium Hypochlorite)					
Chlorine	Cl	35 5	absorbed by 1 to 2.5 vols.		
Chloroform	$CHCl_2$	119.5	sp. s.	sp. s.	v. s.
Chrome Alum (see Alum Chrome)					
Copper Acetate (see Verdigris)	$Cu(C_3H_3O_2)_2,H_2O$	199	14	5	1 in 14
" Bromide	$CuBr_2$	223.4	1	.75	s.
" Chloride	$CuCl_2,H_2O$	170.5	1	.75	v. s.
" Sulphate (see Blue Vitriol)	$CuSO_4,5H_2O$	249.2	3	1	n. s.
" " and Ammonia	$CuSO_4,4NH_3+H_2O$	245.5	s.	v. s.	n. s.
Corrosive Sublimate (see Mercuric Chloride)					
Dextrine	$C_6H_{10}O_5$	162	easily s.		n. s.
Eikonogen (Amido-β-Naphthol-β-Monosulphonate of Sodium)	$C_6H_{10}O_5$	261	40	e. s.	s.
Eosine, Yellow Shade (Tetra Bromo-fluoresceine Potassium)	$C_{20}H_6Br_4O_5K_2$	724	s.	s.	s.
Eosine, Red Shade (Tetra Brom.-fluores. Sod)	$C_{20}H_6Br_4O_5Na_2$	692	s.	s.	s.
Epsom Salt (see Magnesium Sulphate)					
Erythrosine M. (Tetra Iodo-fluoresceine Potassium or Sodium)	$C_{20}H_6I_4O_5K_2$ or Na_2	912 or 880	s.	s.	s.
Erythrosine G. (Di-iodo-fluoresceine Potassium or Sodium)	$C_{20}H_6I_2O_5K_2$ or Na_2	660 or 628	s.	s.	s.

Gelatine, Glutine	49,3C,6,6H18,3N25,8O	1267.2	sp. s.	e. s.	n. s.
Glycerine	$C_3H_8O_3$	92	in all proportions.		
Glycine (Oxy-phenylglycine)	$C_8H_9O_3N$	167	.....	.....	.....
Gold, Neutral Chloride	$AuCl_3$	303.5	1	5	also in ether.
" and Cadmium Chloride	$CaAuCl_5$	414.5	s.	s.	s.
" and Potassium Chloride	$KAuCl_4+5H_2O$	468	s.	s.	s.
" and Sodium Chloride	$NaAuCl_4+8NaCl+2H_2O$	892	s.	s.	s.
" Sodium Hyposulphite	$AuNa_3S_4+2H_2O$	525	s.	s.	s.
Gun Cotton (Tetra-nitrate Cellulose)	$C_{12}H_{16}O_6(NO_3)_4$	564	n. s.	n. s.	in ether
" " (Tri-nitrate Cellulose)	$C_{10}H_{17}O_7(NO_6)_3$	459	n. s.	n. s.	alcohol
Hydrochinone	$C_6H_6O_2$	110	s.	s.	also in ether.
Hydroxylamine Hydrochlorate	NH_3OHCl	69.5	0.6	e. s.	4
Iodine	I	127	sp. s.	sp. s.	e. s.
Iridium Tetra-chloride	$IrCl_4$	335	.....	.....	.....
Iron, Ammonium Sulphate	$FeSO_4(NH_4)_2SO_4+6H_2O$	392	v. s.	dec.	n. s.
" Chloride (Ferric)	Fe_2Cl_6	325	.75	.5	1 in 1
" Chloride (Ferrous)	$FeCl_2$	127	2	1	1 in 1
" Citrate	$Fe_2(C_6H_5O_7)_2$	598	s.	s.	n. s.
" Citrate and Ammonia	$(C_6H_5O_7)_2Fe_2(NH_4)_3$	355	s.	s.	sp. s.
" Iodide	FeI_2	310	v. s.	v. s.	v. s.
" Nitrate	$Fe(NO_3)_2,6H_2O$	288	v. s.	dec.	dec.
" Oxalate (Ferric)	$Fe_2(C_2O_4)_3$	376	s.	s.	n. s.
" " (Ferrous)	FeC_2O_4	144	in potassium oxal.		n. s.
" Sulphate (Ferric)	$Fe_2(SO_4)_3$	400	s.	dec.	s.
" " (Ferrous)	$FeSO_4,7H_2O$	278	1.5	1	n. s.
Kaoline	$H_2Al_2Si_2O_8+H_2O$	258.8	not soluble.		.....
Lead, Acetate (see Sugar of Lead)	$Pb(C_2H_3O_2)_2,3H_2O$	378	2.5	2	1 in 12.5
" Carbonate	$PbCO_4$	366	n. s.	sp. s.	n. s.
" Iodide	PbI_2	460	s.	s.	n. s.
" Nitrate	$Pb(NO_3)_2$	330	7.7	7	s.
" Oxide	PbO	222.4	n. s.	n. s.	Alkalis.
Lithium, Bromide	LiBr	87	.66	.5	v. s.
" Chloride	$LiCl+H_2O$	60.5	1.3	1	s.
" Iodide	LiI	134	.61	.5	s.
Magnesium, Bromide	$MgBr_2$	184	1	.75	s.

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Name.	Symbol.	Atomic Weight.	One Part is Soluble in Cold Water.	One Part is Soluble in Hot Water.	Alcohol.
Magnesuim, Chloride	$MgCl_2$	95	2	1.5	s.
" Iodide	MgI_2	246.3	1	.75	v. s.
" Sulphate (see Epsom Salt)	$MgSO_4,7H_2O$	246	1.3	1	sp. s.
Manganous Chloride	$MnCl_2+4H_2O$	198	s.	s.	n. s.
Mercury, Chloride (Mercuric) (see Corros. Subl.)	$HgCl_2$	271	19	3	5
" " (Mercurous) (see Calomel)	Hg_2Cl	235.5	n. s.	n. s.	n. s.
" Cyanide	$HgCy_2$	252	8	2	1 in 20
" Iodide (Mercuric)	HgI_2	454	sp. s.	sp. s.	sp. s.
" " (Mercurous)	Hg_2I	654	n. s.	n. s.	n. s.
Metol (Mono-methyl Para-amidometakresol)	$C_8H_{11}NO$	137	s.	s.	s.
Para-amidophenol	C_6H_7NO	109	sp. s.	s.	.....
Para-amidophenol Sodium	C_6H_6NaNO	131	easily	soluble.	.....
Para-amidophenol Hydrochlorate	C_6H_7NOHCl	145.5	s.	s.	s.
Para-rosaniline (Triamido-phenyl-Carbinol)	$C_{19}H_{19}N_3O$	305	.....	.....	.....
Phenol (see Carbolic Acid)	.....	.....	.....	.....	.....
Platino-potassium Chloride or Chloro-platinite of Potassium	K_2PtCl_4	417.4	6.	.....	s.
Platino sodium Chloride or Chloro-platinite of Sodium	Na_2PtCl_4	385.4	solu	ble.	.....
Platinum Chloride	$PtCl_4+5H_2O$	429.4	.....	*	.....
Potassa (see Potassium Hydrate)	.....	.....	.....	.....	.....

* Real platinum-chloride is but little soluble in water; the article of commerce of that name answers to the formula $PtCl_4 2HCl+6H_2O$, and is of the atomic weight 520.4 (K. Schwier). It is easily soluble in water, probably in the proportion of 1:6.

Potassium, Aluminium Sulphate (see Alum)	$Al_2(SO_4)_3,K_2SO_4,24H_2O$	948	10	8	n. s.
" Bicarbonate	$KHCO_3$	100	3	2	n. s.
" Bichromate	$K_2Cr_2O_7$	295	10	7	n. s.
" Bromide	KBr	119	2	1	1 in 90
" Carbonate	$KO_2C_2+2H_2O$	174	.75	.5	n. s.
" Chlorate	$KClO_3$	122.5	16	2	n. s.
" Chloride	KCl	74.5	3	2	sp. s.
" Chromic Sulph. (see Chrome Alum)	$Cr_2(SO_4)_3,K_2SO_4,24H_2O$	999	10	dec.	n. s.
" Citrate	$K_3C_6H_5O_7H_2O$	324 3	6.6	.3	n. s.
" Cyanide	KCy	65.1	1	.5	sp. s.
" Ferric Sulphate	$K_2SO_4,Fe_2(SO_4)_3,24H_2O$	100.6	s.	s.	n. s.
" Ferri-cyanide (see Red Prussiate)	$K_6Fe_2Cy_{12}$	658.6	2.5	1.2	n. s.
" Ferro-cyanide (see Yellow Pruss.)	K_4FeCy_6	368.4	3	1	n. s.
" Fluoride	$KFl+2H_2O$	94	v. s.	v. s.	v. s.
" Hydrate	KOH	56	.5	.25	sp. s.
" Iodide	KI	166	.75	.5	1 in 16
" Nitrate (see Saltpetre)	KNO_3	101	4	1	n. s.
" Oxalate	$KC_2O_4H_2O$	235	3	2	sp. s.
" Permanganate	$KMnO_4$	158	16	10	n. s.
" Sulpho-cyanate	$KCyS$	97	2	1	sp. s.
Pyrogallo. (see Pyrogallic Acid)					
Rhodan (German appellation for Cyanates)					
Rodinal (ready-prepared Para-amido Developer)					
Silver, Acetate	$AgC_2H_3O^2$	167	sp. s.	sp. s.	n. s.
" Bromide	$AgBr$	188	n. s.	n. s.	in HCl and HBr.
" Carbonate	Ag_2CO_3	276	n. s.	n. s.	n. s.
" Chloride	$AgCl$	143.5	n. s.	n. s.	Ammonia, cyan. potass. hyposulphite of soda.
" Citrate	$Ag_3C_6H_5O_7$	513	sp. s.	sp. s.	
" Fluoride	$AgFl$	127	v. s.	v. s.	v. s.
" Iodide	AgI	235	n. s.	n. s.	same as Chloride.
" Nitrate	$AgNO_3$	170	1	.5	sp. s.

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Abbreviations.—s., soluble; v. s., very soluble; sp. s., sparingly soluble; n. s., not soluble; dec., decomposed; del., deliquescent.

Name.	Symbol.	Atomic Weight.	One Part is Soluble in Cold Water.	One Part is Soluble in Hot Water.	Alcohol.
Silver, Nitrite	$AgNO_2$	154	300	dec.	n. s.
" Oxalate	$Ag_2C_2O_4$	304	sp. s.	s.	n s.
" Oxide	Ag_2O	232	n. s.	n. s.	n. s.
" Sulphide	Ag_2S	248	n. s.	n. s.	n. s.
Soda, Caustic (see Sodium Hydrate)					
Sodium Acetate	$NaC_2H_3O_2,6H_2O$	190	3	.66	n. s.
" Biborate (Borax)	$Na_2B_4O_7,10H_2O$	382	12.5	2	n. s.
" Bromide	$NaBr$	103	1.25	1	1:16
" Bicarbonate	$NaHCO_3$	84	12	dec.	n. s.
" Carbonate	$Na_2CO_3,10H_2O$	286	2	1	n. s.
" Chloride	$NaCl$	58.5	2.75	2.75	n. s.
" Citrate	$Na_3C_6H_5O_7$	258	1	.5	sp. s.
" Hydrate	$NaHO$	40	1.5	·5	sp. s.
" Hypo-sulphite	$Na_2S_2O_35H_2O$	248	1.5	1	sp. s.
" Iodide	NaI	150	.5	.3	sp. s.
" Nitrate	$NaNO_3$	85	1.36	1	1 in 37
" Sulph-antimoniate or Schlippe's Salt	$NaSbS_3$	241	s.	s.	n. s.
" Sulphate	$Na_2SO_4,10H_2O$	322	2	4	s.
" Sulphide	$Na_2S,9H_2O$	240	s.	s.	sp. s.
" Sulphite	$Na_2SO_3,7H_2O$	252	4	2	sp. s.
" Tungstate	$Na_2WO_4+2H_2O$	326	s.	s.	n. s.
" Thio-sulphate (see Hypo-sulphite)					
Strontium, Bromide	$SrBr_2,6H_2O$	355.5	1	.75	sp. s.
" Chloride	$SrCl_2,6H_2O$	266.5	1.8	1	sp. s.

Strontium, Nitrate	$Sr(NO_3)_2$	211.5	5	2	sp. s.
Sugar of Lead (see Lead Acetate)					
Tannin (see Digallic Acid)					
Thymol	$C_6H_3(CH_3(C_3H_7)COO$	177	sp.		and in ether.
Tin, Chloride (Stannic)	$SnCl_4$	260	dec.	in much	water.
" Chloride (Stannous)	$SnCl_2,2H_2O$	225	135:100	655:100	v. s.
Uranium, Bromide	$UBr_2,4H_2O$	352	1	.5	sp. s.
" Nitrate	$UO_2(NO_3)_2.6H_2O$	384	.5	.25	v. s.
" Sulphate	$UO_2(SO_4),3H_2O$	302	.5	.25	v. s.
Verdigris (see Copper Acetate)					
Vitriol, Blue (see Copper Sulphate)					
" Green (see Iron Sulphate)					
" White (see Zinc Sulphate)					
Water	H_2O	18			
Washing Soda (see Sodium Carbonate)					
Wood Alcohol (see Alcohol Methyl)					
Zinc, Bromide	$ZnBr_2$	225	del.	and e. s.	s.
" Chloride	$ZnCl_2$	136	.33		s.
" Iodide	ZnI_2	319	.33	dec.	v. s.
" Nitrate	$Zn(NO_3)_2,6H_2O$	296	del.	del.	del.
" Sulphate (see White Vitriol)	$ZnSO_4,7H_2O$	287	2.	1.	n. s.
Zircon Earth	Z_1O_2	121.6	n. s.	n. s.	n. s.

IMPURITIES IN PHOTOGRAPHIC CHEMICALS AND TESTS FOR THEM.

Substance.	Impurities Possibly Present.	Tests.
Ammonia	Carbonic Acid.	Renders lime-water milky.
	Dissolved solid matter	Residue left on evaporation.
	Chlorides.	After acidulating with nitric acid, it gives a precipitate with silver nitrate, which, after washing, is readily soluble in ammonia, and re-precipitated by nitric acid.
	Sulphates.	After acidulating with nitric acid, it gives a precipitate with barium nitrate.
	Lime.	A white precipitate with oxalate of ammonium.
	Lead is often present, derived from the action upon flint glass bottles.	Black precipitate with sulphuretted hydrogen.
Nitric Acid	Traces of sulphuric acid.	After dilution it gives a precipitate with barium nitrate.
	Chlorides.	After dilution it gives a precipitate with silver nitrate.
	Peroxide of nitrogen.	The acid is yellow.
	Iodine may be present if the acid be prepared from sodium nitrate.	After dilution and cooling it gives a blue color with starch paste or mucilage.
Hydrochloric Acid	Free chlorine.	Liberates iodine from solution of potassium iodide. See also chlorides, nitric acid.
	Sulphuric acid.	As above for nitric acid.
	Perchloride of iron.	Yellow color. Brown precipitate with ammonia added till it smells slightly.
Hydrochloric Acid	Arsenic.	Marsh's test.
	Some yellow samples contain no iron, but an organic salt, and give an alkaline ash on ignition of the residue after evaporation.	Reinsh's test; a small piece of copper foil becomes coated on boiling in dilute acid.
Sulphuric Acid	Bisulphate of potassium.	Residue on evaporation.
	Sulphate of lead.	Milkiness on dilution. May be completely freed from lead by diluting with three or four times as much water, and allowing to settle.
	When sold as pure, it invariably contains a trace of iron. Common acid is also liable to contain arsenic, selenium, thallium, and many other substances.	No easy test can be given, as the substances are so numerous; some of them volatile, and most require separation from the acid before detection.
	Organic matter, as a piece of straw in a carboy of acid.	Gives a brown color to the acid.
Acetic Acid	Water.	Does not solidify when cooled to 17° C. (53° F.)
	Sulphurous and hydrochloric acids.	White precipitate with silver nitrate.
	Aldehyde, or volatile tarry matter.	Blackens in the light after adding silver nitrate.
	Organic sulphuric acid.	Smell of garlic.
Citric Acid	Tartaric acid.	Strong solution of potassium acetate added to a strong solution of the acid will deposit white crystalline bitartrate.
Pyrogallic Acid	Metagallic acid.	Black residue insoluble in water.
Silver Nitrate	Free nitric acid.	Reddens litmus paper (neutral silver nitrate does not affect litmus).
Potassium Carbonate	Chlorides and sulphates.	Same as for ammonia.
Potassium Iodide	Potassium carbonate.	A strong solution is alkaline to test paper.
	Sulphates and chlorides.	Same as for ammonia.
	Potassium iodate.	A pretty strong solution becomes yellow from liberation of iodine on addition of dilute sulphuric acid, or better, a strong solution of citric acid.

IMPURITIES IN PHOTOGRAPHIC CHEMICALS AND TESTS FOR THEM.—*Continued.*

Substance.	Impurities Possibly Present.	Test.
Potassium Bromide	Similar to potassium iodide.	See potassium iodide.
Sodium Carbonate	Chlorides and sulphates.	Same as for ammonia.
Sodium Chloride	Chloride of calcium.	Oxalate of ammonium (after addition of a little acetic acid) gives a milkiness or precipitate, indicating calcium; filter this out, and add ammonia, chloride of ammonium, and phosphate of sodium (clear solutions). A precipitate indicates magnesium. Both the above cause dampness in wet weather.
	Chloride of magnesium.	
	Sodium sulphate.	As for sulphates in ammonia.
Potassium Cyanide	Potassium carbonate nearly always present.	Effervescence with dilute acids, giving off a gas carbonic anhydride, which renders lime water turbid.
Potassium Hydrate		
Kaolin	Chalk.	Effervescence with dilute acids.
Water	Sulphates and chlorides.	Same as for ammonia.
	Calcium carbonate, temporary hardness.	Deposited by boiling.
	Ammonia, almost always present in distilled and rain water.	Test as for calcium chloride, see sodium chloride.
		Brown coloration, or precipitate with Nessler's re-agent.
Gelatine	Alum.	Ash, sometimes as much as 10 per cent.
	Fatty matter.	Separated by precipitation with alcohol. Dissolved out by ether or benzine, and left as a residue on evaporation of the solvent.
Ammonium Bromide	Potassium bromide, or other non-volatile bodies.	Leaves a residue when heated.
	Ammonium chloride.	Same as for chlorides in ammonia.
Pyrogallic Acid	Powdered glass.	Left behind on solution.
Potassium Iodide	Potassium bromide.	The crystals of bromide are usually more transparent than those of iodide, but no reliance can be placed on this.
Silver Nitrate	Potassium nitrate, sometimes present in the fused sticks, not in the crystals.	Will not yield the full quantity of chloride on precipitation with HCl. Gives a purple color to flame.
Calcium Chloride	Calcium hydrate.	The clear filtered solution made with distilled water is alkaline to test paper, and gives a precipitate on breathing into it through a tube.
Pure Chemicals generally.	Broken glass, bits of straw, wood, paper, &c.	These impurities either float or sink on the solution, and may easily be seen.

COMPARISON OF EIKONOGEN DEVELOPERS FOR RAPID EXPOSURES.

REDUCED TO ONE OUNCE OF PREPARED DEVELOPER.

By C. W. GRANT.

No.	Water.	Eiko.	Sulph. Sodium.	Carb. Pot.	Remarks.
	1 oz.	Grs.	Grs.	Grs.	
1	480 m.	7.3	43.7	10.9	*American Amateur Photographer*, Aug. 1890, p. 303.
2	"	8.3	22	11	By Seed Dry Plate Co. *
3	"	5.5	11	11	" Cramer Dry Plate Co. *
4	"	16	64	16	" Harvard " " *
5	"	16	32	16	" Gottheil. AM. ANN., 1890, p. 269.‡‡
6	"	6	30	12A	" W. H. Rau.† AM. ANN., 1890, p. 225.
7	"	12	32	12	" Allen & Rowell.††
8	"	6	24	16	" Eagle D. P. Works.
9	"	6	12	9B	" U. S. Supply Co.
10	"	12	24	8	" John Nicol.** AM. ANN., 1890, p. 41.
11	"	6	28	9C	" F. C. Beach.‡
12	"	5	30	5	" *Photo. Times.****
					" Chautauqua School.
Totals.	5760	106.1	352.7	135.9	Divide by 12—Equals Average.
No. 1	480 m.	8.8	29.4	11.3	Average.
No. 2	480 m.	9.5	29.4	12.2	Average, Nos. 1 to 10 inclusive.
.....	480 m.	12	32	12	Recommended.

Allen & Rowell furnished the following formula for use with their slide plates, and can attest its efficiency, and I use it exclusively for slides and bromide prints, but substitute carb. pot. for c. soda.

Water to make	1 ounce
Sulph. Soda (cryst.)	18 grains
Eiko	3 grains
Quinol	3 grains
Carb. Soda	18 grains
Carb. Lithium	3 grains

* These were taken from an article by Mr. F. C. Beach.

‡‡ Herr Gottheil gives Carb. Pot. (as above) for rapid exposures.

† Mr. Rau considers Eiko. with Carb. *Soda*, inferior to Pyro.

‡ Mr. Beach considers Carb. Pot. more powerful than Carb. Soda, and less liable to cause stains. Confirmed by Gottheil, Rau, Nos. 1, 2, 3, 4, 5, 7, 8, 10, 12, and by compiler.

††—A. Given as 24 grs. Carb. Soda.

***—C. Given as 17 grs. Carb. Soda. Not stated if for rapid exposures.

**—B. Given as 9 grs. Carb. Soda.

TABLE OF EXPOSURES.

By H. L. Ide.

Intended for use with Carbutt's Special Sensitometer 25 Plates. The table being prepared from the diagram of comparative exposures published on page 308 of '92 Times Annual and intended to be used in connection with this diagram for ascertaining the exposure in other months of the year.

Hours. Morning.	5					6					7					8					9					10					11					12					Noon.	Month,
Evening.	7					6					5					4					3					2					1					12					Afternoon	July.
U. S. Stop Number.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	Sunshine.	Sun obscured.	Cloudy.	Very dull.	Gloomy.	U. S. Stop Number.	Remarks.
Near view, with foliage or dark objects or shadows in foreground Portraits and living objects out of doors.	1	1/5	3/8	1/2	3/4	1	1/20	1/10	1/8	1/5	1/4	1/40	1/20	1/16	1/10	1/8	1/64	1/32	1/20	1/16	1/10	1/72	1/36	1/24	1/18	1/12	1/80	1/40	1/32	1/20	1/16	2	Near view, light colored buildings or bright objects in foreground. Near view, with long distance street scenes.
	2	3/8	3/4	1	1½	2	1/10	1/5	1/4	3/8	1/2	1/20	1/10	1/8	1/5	1/4	1/32	1/16	1/10	1/8	1/5	1/36	1/18	1/12	1/9	1/6	1/40	1/20	1/16	1/10	1/8	4	
	4	3/4	1½	2	3	4	1/5	3/8	1/2	3/4	1	1/16	1/5	1/4	3/8	1/2	1/16	1/8	1/5	1/4	3/8	1/18	1/9	1/6	2/9	1/3	1/20	1/10	1/8	1/5	1/4	8	
	8	1½	3	4	6	8	3/8	3/4	1	1½	2	1/5	3/8	1/2	3/4	1	1/8	1/4	3/8	1/2	3/4	1/9	2/9	1/3	4/9	3/5	1/10	1/5	1/4	3/8	1/2	16	
	16	3	6	8	12	16	3/4	1½	2	3	4	3/8	3/4	1	1½	2	1/4	1/2	3/4	1	1½	2/9	4/9	3/5	7/8	1⅕	1/5	3/8	1/2	3/4	1	32	
	32	6	12	16	24	32	1½	3	4	6	8	3/4	1½	2	3	4	1/2	1	1½	2	3	4/9	7/8	1⅕	1¾	2⅜	3/8	3/4	1	1½	2	64	
	64	12	24	32	48	64	3	6	8	12	16	1½	3	4	6	8	1	2	3	4	6	7/8	1¾	2⅜	3½	4¾	3/4	1½	2	3	4	128	
	128	24	48	64	96	128	6	12	16	24	32	3	6	8	12	16	2	4	6	8	12	1⅝	3½	4¾	7	9½	1½	3	4	6	8	256	
Distant view, no near foreground.	2	1/10	1/5	1/4	3/8	1/2	1/40	1/20	1/16	1/10	1/8	1/80	1/40	1/32	1/20	1/16	1/128	1/72	1/40	1/32	1/20	1/144	1/72	1/48	1/36	1/24	1/160	1/80	1/64	1/40	1/32	8	Sea and sky.
	4	1/5	3/8	1/2	3/4	1	1/20	1/10	1/8	1/5	1/4	1/40	1/20	1/16	1/10	1/8	1/64	1/32	1/20	1/16	1/10	1/72	1/36	1/24	1/18	1/12	1/80	1/40	1/32	1/20	1/16	16	
	8	3/8	3/4	1	1½	2	1/10	1/5	1/4	3/8	1/2	1/20	1/10	1/8	1/5	1/4	1/32	1/16	1/10	1/8	1/5	1/36	1/18	1/12	1/9	1/6	1/40	1/20	1/16	1/10	1/8	32	
	16	3/4	1½	2	3	4	1/5	3/8	1/2	3/4	1	1/10	1/5	1/4	3/8	1/2	1/16	1/8	1/5	1/4	3/8	1/18	1/9	1/6	2/9	1/3	1/20	1/10	1/8	1/5	1/4	64	
	32	1½	3	4	6	8	3/8	3/4	1	1½	2	1/5	3/8	1/2	3/4	1	1/8	1/4	3/8	1/2	3/4	1/9	2/9	1/6	4/9	3/5	1/10	1/5	1/4	3/8	1/2	128	
	64	3	6	8	12	16	3/4	1½	2	3	4	3/8	3/4	1	1½	2	1/4	1/2	3/4	1	1½	2/9	4/9	3/5	7/8	1⅕	1/5	3/8	1/2	3/4	1	256	
	128	6	12	16	24	32	1½	3	4	6	8	3/4	1½	2	3	4	1/2	1	1½	2	3	4/9	7/8	1⅕	1¾	2⅜	3/8	3/4	1/2	1½	2		

TABLE INDICATING THE DISTANCE AT WHICH THE DEPTH OF FOCUS BECOMES INFINITE.

Focal Distance in Centimetres.	Relation of Lighting.											
	$\frac{f}{5}$	$\frac{f}{10}$	$\frac{f}{15}$	$\frac{f}{20}$	$\frac{f}{25}$	$\frac{f}{30}$	$\frac{f}{35}$	$\frac{f}{40}$	$\frac{f}{45}$	$\frac{f}{50}$	$\frac{f}{55}$	$\frac{f}{60}$
5.....	2.5	1.3	0 9	0.7	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3
10.....	10.0	5.0	3.4	2.5	2.0	1.7	1.5	1.3	1.2	1.0	0.9	0.9
15.....	22.5	11.3	7.5	5.7	4.5	3.8	3.3	2.9	2.5	2.3	2.1	1.9
20.....	40.0	20.0	13.4	10.0	8.0	6.7	5.8	5.0	4.5	4.0	3.7	3.4
25.....	62.5	31.3	20.9	15.7	12.5	10.5	9.0	7.9	7.0	6.3	5.7	5.3
30.....	90.0	45.0	30.0	22.5	18.0	15.0	12.9	11.3	10.0	9.0	8.2	7.5
35	122 5	61.3	40.9	30.7	22.5	20.5	17.5	15.4	13.6	12.3	11.2	10.3
40.....	160.0	80.0	53.4	40.0	32.0	26.7	22.9	20.0	17.8	16.0	14.6	13.4
45.....	202.5	101.3	67.5	50.7	40.5	33.8	29.0	25.4	22.5	20.3	18.4	16.9
50.....	250	125.0	83.4	62.5	50.0	41.7	35.8	31.3	27.8	25.0	22.8	20.9

To find the distance of the nearest object beyond which everything is in focus with a lens of 0^m 15 of focus; with a diaphragm of which the relation of lighting is $f/20$ we search in the horizontal line this relation and looking in this column we find opposite the figure 15, indicating the focal distance, the figure 5.7 or 5^m 70 for the distance from which all the points situated further on will give a sharp image on the ground-glass.

If the focal distance is not found in the table, or if the relation of lighting is not given exactly as on the diaphragm, one can use the following formula which gives the same result:

$$P^p = \frac{F^2}{n \times 2.}$$

That is to say, to know the depth posterior to p^p of the focus, raise to the square the focal length F, and divide the square by the denominator of the fraction indicating the diaphragm *n* multiplied by 2; for example, for the case above cited:

$$\frac{15^2}{20 \times 2} = \frac{225}{40} = 5.60, \text{ hence } 5^m60.$$

One sees that this second method gives very nearly the same result, and a result accurate enough in practice.

TABLE OF EQUIVALENT QUANTITIES OF SOME HALOIDS USED IN PHOTOGRAPHY.

CALCULATED FOR THE ANHYDROUS AND DRY SALTS.

By A. B. AUBERT, Professor of Chemistry, Maine State College, Orono, Me.

†EQUIVALENT QUANTITIES OF VARIOUS CHLORIDES USED IN PHOTOGRAPHY.

Sodium Chloride.	Potassium Chloride.	Ammonium Chloride.	Lithium Chloride.	Cadmium Chloride.
1	1.275	0.914	0.726	1.564
0.784	1	0.717	0.569	1.226
1.093	1.394	1	0.794	1.710
1.376	1.755	1.258	1	2.152
0.639	0.818	0.584	0.464	1

†EQUIVALENT QUANTITIES OF VARIOUS BROMIDES USED IN PHOTOGRAPHY.

Bromine.	Ammonium Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide + 4 Equi. Water.	Zinc Bromide.
1	1.225	1.488	1.287	2.150	1.406
0.816	1	1.214	1.055	1.754	1.147
0.672	0.823	1	0.865	1.445	0.945
0.777	0.952	1.156	1	1.671	1.092
0.465	0.570	0.692	0.599	1	0.654
0.711	0.871	1.058	0.915	1.529	1

†EQUIVALENT QUANTITIES OF VARIOUS IODIDES USED IN PHOTOGRAPHY.

Iodine.	Ammonium Iodide.	Potassium Iodide.	Sodium Iodide.	Cadmium Iodide.	Zinc Iodide.
1	1.142	1.307	1.181	1.441	1.255
0.876	1	1.145	1.035	1.262	1.099
0.765	0.874	1	0.903	1.102	0.960
0.847	0.967	1.107	1	1.220	1.063
0.694	0.793	0.907	0.820	1	0.871
0.797	0.910	1.042	0.941	1.148	1

†EQUIVALENT QUANTITIES OF VARIOUS SILVER SALTS USED IN PHOTOGRAPHY.

Silver (Metallic).	Nitrate.	Chloride.	Bromide.	Iodide.
1	1.574	1.328	1.741	2.176
0.6353	1	0.844	1.106	1.382
0.7523	1.184	1	1.310	1.638
0.5744	0.904	0.763	1	1.250
0.4595	0.723	0.610	0.800	1

†EQUIVALENT QUANTITES OF VARIOUS GOLD SALTS USED IN PHOTOGRAPHY.

Gold (Metallic).	Chloride.	Double Chloride of Gold and Potassium.	Double Chloride of Gold and Sodium.
1	1.542	2.1048	2.0229
0.6485	1	1.3645	1.3119
0.4751	0.7326	1	0.9611
0.4943	0.7623	1.0405	1

† Translated and partly recalculated from the "Agenda du Chimiste."

ACKLAND'S TABLES FOR THE SIMPLIFICATION OF EMULSION CALCULATIONS.

No. 1.

	Equivalent weights.	Weight of $AgNO_3$ required to convert one grain of soluble haloid.	Weight of soluble haloid required to convert one grain $AgNO_3$.	Weight of silver haloid produced by one grain of soluble haloid.	Weight of soluble haloid required to produce one grain of silver haloid.	Weight of silver haloid produced from one grain $AgNO_3$.
Ammonium bromide.....	98	1.734	.576	1.918	.521	
Potassium "	119.1	1.427	.700	1.578	.633	
Sodium "	103	1.650	.606	1.825	.548	1.106
Cadmium " com...	172	.988	1.012	1.093	.915	
" " anh....	136	1.25	.800	1.382	.723	
Zinc "	112.1	1.509	.663	1.670	.600	
Ammonium chloride.....	53.5	3.177	.315	2.682	.373	.844
Sodium "	58.5	2.906	.344	2.453	.408	
Ammonium iodide.....	145	1.172	.853	1.620	.617	
Potassium "	166.1	1.023	.977	1.415	.707	1.382
Sodium "	150	1.133	.882	1.566	.638	
Cadmium "	183	.929	1.076	1.284	.778	

Table No. 1 presents the actual weights of haloid or silver, as the case may be, required to convert or combine with one grain of another.

In order to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows:

Bromide of potassium..... .....150 grains.
Iodide of potassium..... 10 "
Chloride of ammonium..... 10 "
Gelatine.....200 "

we want to know how much silver nitrate should be employed in sensitizing this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum:

Potassium bromide.....150 × 1.427 = 214 } Weight
" iodide..... ..... 10 × 1.023 = 10.23 } silver nitrate
Chloride of ammonium..... ..... 10 × 3.177 = 31.77 } required.

or the total quantity of silver nitrate required for full conversion, 256.00 grains.

ELSDEN'S TABLE OF POISONS AND ANTIDOTES.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidote.
Caustic Vegetable Acids.	Oxalic Acid. including Potassium Oxalate.	1 dram is the smallest fatal dose known.	Hot, burning sensation in throat and stomach; vomiting, cramps, and numbness.	Chalk, whiting or magnesia, suspended in water. Plaster or mortar can be used in emergency.
Caustic Alkalies.	Ammonia. Potash. Soda.	Vapor of ammonia may cause inflammation of the lungs.	Swelling of tongue, mouth, and fauces; often followed by stricture of the œsophagus.	Vinegar and water.
Metallic Salts.	Mercuric Chloride.	3 grains the smallest known fatal dose.	Acrid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomiting.	White and yolk of raw eggs with milk. In emergency, flour paste may be used.
	Acetate of Lead.	The sub-acetate is still more poisonous.	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	Cyanide of Potassium.	*a.* Taken internally, 3 grs. fatal.	Insensibility, slow, gasping respiration, dilated pupils, and spasmodic closure of the jaws.	No certain remedy; cold affusion over the head and neck most efficacious.
		b. Applied to wounds and abrasures of the skin.	Smarting sensation.	Sulphate of iron should be applied immediately.
	Bichromate of Potassium	*a.* Taken internally.	Irritant pain in stomach, and vomiting.	Emetics and magnesia, or chalk.
		b. Applied to slight abrasions of the skin.	Produces troublesome sores and ulcers.	
	Nitrate of Silver.		Powerful irritant.	Common salt to be given immediately, followed by emetics.
Concentrated Mineral Acids.	Nitric Acid.	2 drams have been fatal. Inhalation of the fumes has also been fatal.	Corrosion of windpipe and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk, plaster of the apartment beaten up in water.
	Hydrochloric Acid.	½ ounce has caused death.		
	Sulphuric Acid.	1 dram has been fatal.		
	Acetic Acid, concentrated, has as powerful an effect as the mineral acids.			
	Iodine.	Variable in its action; 3 grains have been fatal.	Acrid taste, tightness about the throat, vomiting.	Vomiting should be encouraged, and gruel, arrowroot and starch given freely.
	Ether.	When inhaled.	Effects similar to chloroform.	Cold affusion and artificial respiration.
	Pyrogallol.	2 grains sufficient to kill a dog.	Resemble phosphorus poisoning.	No certain remedy. Speedy emetic desirable.

UNITED STATES WEIGHTS AND MEASURES.

ACCORDING TO EXISTING STANDARDS.

LINEAL.

	Inches.	Feet.	Yards.	Rods.	Fur's.	Mile.
12 inches = 1 foot.	12 =	1				
3 feet = 1 yard.	36 =	3 =	1			
5.5 yards = 1 rod.	198 =	16.5 =	5.5 =	1		
40 rods = 1 furlong.	7,920 =	660 =	220 =	40 =	1	
8 furlongs = 1 mile.	63,360 =	5,280 =	1,760 =	320 =	8 =	1

SURFACE—LAND.

	Feet.	Yards.	Rods.	Roods.	Acres.
144 sq. ins. = 1 sq. ft.					
9 sq. ft. = 1 sq. yard.	9 =	1			
30.25 sq. yds. = 1 sq. rod.	272.25 =	30.25 =	1		
40 sq. rods = 1 sq. rood.	10,890 =	1,210 =	40 =	1	
4 sq. roods = 1 acre.	43,560 =	4,840 =	160 =	4 =	1
640 acres = 1 sq. mile.	27,878,400 =	3,097,600 =	102,400 =	2,560 =	640

VOLUME—LIQUID.

	Gills.	Pints.	Gallon.	Cub. In.
4 gills = 1 pint.				
2 pints = 1 quart.	32 =	8 =	1 =	231
4 quarts = 1 gallon.				

FLUID.

Gallon.	Pints.	Ounces.	Drachms.	Minims.	Cubic Centimetres.
1 =	8 =	128 =	1,024 =	61,440 =	3,785,435
	1 =	16 =	128 =	7,680 =	473,179
		1 =	8 =	480 =	29,574
			1 =	60 =	3,697

16 ounces, or a pint, is sometimes called a fluid pound.

TROY WEIGHT.

Pound.	Ounces.	Pennyweights.	Grains.	Grams.
1 =	12 =	240 =	5,760 =	373.24
	1 =	20 =	480 =	31.10
		1 =	24 =	1.56

APOTHECARIES' WEIGHT.

lb.	℥	ʒ	℈	gr.	
Pound.	Ounces.	Drachms.	Scruples.	Grains.	Grams.
1 =	12 =	96 =	288 =	5,760 =	373.24
	1 =	8 =	24 =	480 =	31.10
		1 =	3 =	60 =	3.89
			1 =	20 =	1.30
				1 =	.06

The pound, ounce, and grain are the same as in Troy weight.

AVOIRDUPOIS WEIGHT.

Pound.	Ounces.	Drachms.	Grains (Troy).	Grams.
1 =	16 =	256 =	7,000 =	453.60
	1 =	16 =	437.5 =	28.35
		1 =	27.34 =	1.77

ENGLISH WEIGHTS AND MEASURES.

APOTHECARIES' WEIGHT.

20 Grains	= 1 Scruple =	20 Grains.
3 Scruples	= 1 Drachm =	60 Grains.
8 Drachms	= 1 Ounce =	480 Grains.
12 Ounces	= 1 Pound =	5760 Grains.

FLUID MEASURE.

60 Minims	= 1 Fluid Drachm
8 Drachms	= 1 Fluid Ounce.
20 Ounces	= 1 Pint.
8 Pints	= 1 Gallon.

The above weights are usually adopted in formulas.

All Chemicals are usually sold by

AVOIRDUPOIS WEIGHT.

$27\frac{11}{32}$ Grains	= 1 Drachm =	$27\frac{11}{32}$ Grains.
16 Drachms	= 1 Ounce =	$437\frac{1}{2}$ Grains.
16 Ounces	= 1 Pound =	7000 Grains.

Precious Metals are usually sold by

TROY WEIGHT.

24 Grains	= 1 Pennyweight =	24 Grains.
20 Pennyweights	= 1 Ounce =	480 Grains.
12 Ounces	= 1 Pound =	5760 Grains.

NOTE.—An ounce of metallic silver contains 480 grains, but an ounce of nitrate of silver contains only $437\frac{1}{2}$ grains.

UNITED STATES FLUID MEASURE.

Gal.	Pints.	Ounces.	Drachms.	Mins.	Cub. In.	Grains.	Cub. C.M.
1 =	8 =	128 =	1,024 =	61,440 =	231. =	58,328.886 =	3,785.44
	1 =	16 =	128 =	7,680 =	28.875 =	7,291.1107 =	473.18
		1 =	8 =	480 =	1.8047 =	455.6944 =	29.57
			1 =	60 =	0.2256 =	56.9618 =	3.70

IMPERIAL BRITISH FLUID MEASURE.

Gal.	Pints.	Ounces.	Drachms.	Mins.	Cub. In.	Grains.	Cub. C.M.
1 =	8 =	160 =	1,280 =	76,800 =	277.27384 =	70,000 =	4,543.732
	1 =	20 =	160 =	9,600 =	34.65923 =	8,750 =	567.966
		1 =	8 =	480 =	1.73296 =	437.5 =	28.398
			1 =	60 =	0.21662 =	54.69 =	3.550

METRIC SYSTEM OF WEIGHTS AND MEASURES.

MEASURES OF LENGTH.

Denominations and Values.		Equivalents in Use.
Myriameter	10,000 meters.	6.2137 miles.
Kilometer	1,000 meters.	.62137 mile, or 3,280 ft. 10 ins.
Hectometer	100 meters.	328. feet and 1 inch.
Dekameter	10 meters.	393.7 inches.
Meter	1 meter.	39.37 inches.
Decimeter	1-10th of a meter.	3.937 inches.
Centimeter	1-100th of a meter.	.3937 inch.
Millimeter	1-1000th of a meter.	.0394 inch.

MEASURES OF SURFACE.

Denominations and Values.		Equivalents in Use.
Hectare	10,000 square meters.	2.471 acres.
Are	100 square meters.	119.6 square yards.
Centare	1 square meter.	1,550. square inches.

MEASURES OF VOLUME.

Denominations and Values.			Equivalents in Use.	
Names.	No. of Liters.	Cubic Measures.	Dry Measure.	Wine Measure.
Kiloliter or stere	1,000	1 cubic meter.	1.308 cubic yards.	264.17 gallons.
Hectoliter	100	1-10th cubic meter.	2 bu. and 3.35 pecks.	26.417 gallons.
Dekaliter	10	10 cubic decimeters.	9.08 quarts.	2.6417 gallons.
Liter	1	1 cubic decimeter.	.908 quart.	1.0567 quarts.
Deciliter	1-10	1-10th cubic decimeter.	6.1023 cubic inches.	.845 gill.
Centiliter	1-100	10 cubic centimeters.	.6102 cubic inch.	.338 fluid oz.
Milliliter	1-1000	1 cubic centimeter.	.061 cubic inch.	.27 fl. drm.

WEIGHTS.

Denominations and Values.			Equivalents in Use.
Names.	Number of Grams.	Weight of Volume of Water at its Maximum Density.	Avoirdupois Weight.
Millier or Tonneau	1,000,000	1 cubic meter.	2204.6 pounds.
Quintal	100,000	1 hectoliter.	220.46 pounds.
Myriagram	10,000	10 liters.	22.046 pounds.
Kilogram or Kilo	1,000	1 liter.	2.2046 pounds.
Hectogram	100	1 deciliter.	3.5274 ounces.
Dekagram	10	10 cubic centimeters.	.3527 ounce.
Gram	1	1 cubic centimeter.	15.432 grains.
Decigram	1-10	1-10th of a cubic centimeter.	1.5432 grain.
Centigram	1-100	10 cubic millimeters.	.1543 grain.
Milligram	1-1000	1 cubic millimeter.	.0154 grain.

For measuring surfaces, the square dekameter is used under the term of ARE; the hectare, or 100 ares, is equal to about 2½ acres. *The unit of capacity* is the cubic decimeter or LITER, and the series of measures is formed in the same way as in the case of the table of lengths. The cubic meter is the unit of measure for solid bodies, and is termed STERE. *The unit of weight* is the GRAM, which is the weight of one cubic centimeter of pure water weighed in a vacuum at the temperature of 4 deg. Cent. or 39.2 deg. Fahr., which is about its temperature of maximum density. In practice, the term cubic centimeter, abbreviated c.c, is generally used instead of milliliter, and cubic meter instead of kiloliter.

METRIC SYSTEM OF WEIGHTS AND MEASURES.

THE meter is a measure of length equal to 39.370 English or American inches, a standard of linear measure supposed to be the ten-millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of the meridian.

This system, formed on the meter as the unit of length, has four other leading units, all connected with and dependent upon this. Hence, we have:

1. The meter, which is the unit of measures of length.

2. The are, which is the unit of surface, and is the square of the meter.

3. The liter, which is the unit of measures of capacity, and is the cube of a tenth part of the meter.

4. The stere, which is the unit of measures of solidity, having the capacity of a cubic meter.

5. The gram, which is the unit of measures of weight, and is the weight of that quantity of distilled water at its maximum density, fills the cube of a hundredth part of the meter.

Each unit has its decimal multiples and sub-multiples, that is weights and measures ten times larger, or ten times smaller, than the principal units. The prefixes denoting multiples are derived from the Greek, and are: Deka, ten; hecto, hundred; kilo, thousand; and myria, ten thousand. Those denoting sub-multiples are taken from the Latin, and are: Deci, ten; centi, hundred (as in centigram or centimeter); and milli, thousand.

The metric system has been adopted by many nations, the English excepted. In America its use has been made optional, but is legalized by Congress. All photographic formulas received from the continent of Europe express values and quantities with metrical weights and measures. To utilize them directly without translating into the expressions of the English system, the student is advised to procure gram weights and cubic centimeter graduates, and substitute them for those denoting quantities according to the old plan.

As an assistance to those who cannot acquire these aids, we annex tables, which convert grams and cubic centimeters into English grains, drachms, and ounces sufficiently correct for practical purposes.

METRIC FLUID MEASURES.

The cubic centimeter, usually represented by "C.c.," is the unit of the metric measurement for liquids. It contains 17 minims of water. The weight of this quantity of water is 1 gram. The following table will prove to be sufficiently accurate for photographic purposes:

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH MEASURE.

1 cubic centimeter	=	17	minims.					
1 cubic centimeters	=	34	"					
3 "	=	51	"					
4 "	=	68	"	or 1	dram	8	minims.	
5 "	=	85	"	" 1	"	25	"	
6 "	=	101	"	" 1	"	41	"	
7 "	=	118	"	" 1	"	58	"	
8 "	=	135	"	" 2	drams	15	"	
9 "	=	152	"	" 2	"	32	"	
10 "	=	169	"	" 2	"	49	"	
20 "	=	338	"	" 5	"	38	"	
30 "	=	507	"	" 1	ounce	0	dram	27 minims
40 "	=	676	"	" 1	"	3	drams	16 "
50 "	=	845	"	" 1	"	6	"	5 "
60 "	=	1014	"	" 2	ounces	0	"	54 "
70 "	=	1183	"	" 2	"	3	"	43 "
80 "	=	1352	"	" 2	"	6	"	32 "
90 "	=	1521	"	" 3	"	1	"	21 "
100 "	=	1690	"	" 3	"	4	"	10 "
1000 "	=	1 liter = 34 fluid ounces nearly, or $2\frac{1}{8}$ pints.						

THE CONVERSION OF FRENCH (METRIC) INTO ENGLISH WEIGHT.

The following table, which contains no error greater than one-tenth of a grain, will suffice for most practical purposes:

1 gram	=	$15\frac{2}{5}$	grains.					
2 grams	=	$30\frac{4}{5}$	"					
3 "	=	$46\frac{1}{5}$	"					
4 "	=	$61\frac{4}{5}$	"	.....	or	1	dram	$1\frac{4}{5}$ grain.
5 "	=	$77\frac{1}{5}$	"	.....	"	1	"	$17\frac{1}{5}$ grains.
6 "	=	$92\frac{3}{5}$	"	.....	"	1	"	$32\frac{3}{5}$ "
7 "	=	108	"	.....	"	1	"	48 "
8 "	=	$123\frac{2}{5}$	"	.....	"	2	drams	$3\frac{2}{5}$ "
9 "	=	$138\frac{4}{5}$	"	.....	"	2	"	$18\frac{4}{5}$ "
10 "	=	$154\frac{2}{5}$	"	.....	"	2	"	$34\frac{2}{5}$ "
11 "	=	$169\frac{4}{5}$	"	.....	"	2	"	$49\frac{4}{5}$ "
12 "	=	$185\frac{1}{5}$	"	.....	"	3	"	$5\frac{1}{5}$ "
13 "	=	$200\frac{3}{5}$	"	.....	"	3	"	$20\frac{3}{5}$ "
14 "	=	216	"	.....	"	3	"	36 "
15 "	=	$231\frac{2}{5}$	"	.....	"	3	"	$51\frac{2}{5}$ "
16 "	=	247	"	.....	"	4	"	7 "
17 "	=	$262\frac{2}{5}$	"	.....	"	4	"	$22\frac{2}{5}$ "
18 "	=	$277\frac{4}{5}$	"	.....	"	4	"	$37\frac{4}{5}$ "
19 "	=	$293\frac{1}{5}$	"	.....	"	4	"	$53\frac{1}{5}$ "
20 "	=	$308\frac{3}{5}$	"	.....	"	5	"	$8\frac{3}{5}$ "
30 "	=	463	"	.....	"	7	"	43 "
40 "	=	$617\frac{1}{5}$	"	.....	"	10	"	$17\frac{1}{5}$ "
50 "	=	$771\frac{3}{5}$	"	.....	"	12	"	$51\frac{3}{5}$ "
60 "	=	926	"	.....	"	15	"	26 "
70 "	=	$1080\frac{1}{5}$	"	.....	"	18	"	$0\frac{1}{5}$ "
80 "	=	$1234\frac{3}{5}$	"	.....	"	20	"	$34\frac{3}{5}$ "
90 "	=	1389	"	.....	"	23	"	9 "
100 "	=	$1543\frac{1}{5}$	"	.....	"	25	"	$43\frac{1}{5}$ "
1000 "	=	1 kilogram = 32 oz., 1 dr., $12\frac{2}{5}$ gr.						

THE CONVERSION OF METRIC INTO AMERICAN MEASURE.

By Nelson B. Sizer, B.Sc., M.D.

[From *The Photographic Times*, August 14, 1891.]

The following table is computed true to the nearest half grain or minim, as the case may be, so it will prove a sufficiently near approximation to the required metric equivalents.

U. S. P. Standard.

Gram, or c.cm.	Grains.	Minims.	Gram, or c.cm.	Grains.	Minims.	
1	15½	16¼	15	231½	244	The "kilo" or kilogram, the 1,000 gram weight, is equal to 32 ounces $72\frac{2}{10}$ grains "Troy or Apothecaries" weight, or 2 pounds 3 ounces $119\frac{7}{10}$ grains Avoirdupois.
2	31	32½	16	247	260	
3	46	49	17	262	276	
4	62	65	18	278	292½	
5	77	81	19	293	309	
6	93	97½	20	308½	325	
7	108	114	30	463	487½	
8	123½	130	40	617	650	
9	139	146	50	771½	813	The "liter" or 1,000 cubic centimeters, or bulk of water that weighs 1 kilo, is equal to 2 pints 1 fluid ounce and $415\frac{3}{10}$ minims, U. S. P. Standard, or our glass graduates as commonly sold by reliable houses.
10	154	162½	60	926	975½	
11	170	179	70	1,080	1,138	
12	185	194	80	1,234½	1,300½	
13	201	211	90	1,389	1,463	
14	216	227½	100	1,543	1,625½	
..	....	....	1,000	15,432½	16,256½	
..	....	....	....	1 kilo.	liter.	

The grains and minims are easily reduced to fluid drachms and fluid ounces, or drachms and ounces Troy, by my readers, if they will only remember that 60 grains or minims go to the solid or fluid drachm, and 480 grains or minims, or 8 drachms solid or fluid, go to each U. S. P. ounce, solid or fluid.

Thus the table gives the value of 90 grams as 1,389 grains, of 90 cubic centimeters as 1,463 minims. How many ounces in each?

Dividing 1,389 by 60 for drachms, we have 23 drachms 9 grains. As 8 drachms go to the ounce, there are 2 ounces in the 23 drachms and 7 drachms over, so we have—in 1,389 grains there are 2 ounces 7 drachms 9 grains. In the same way we find 3 fluid ounces and 23 minims over, to be the value of 90 cubic centimeters or 1,463 minims.

TABLE SHOWING THE COMPARISON OF THE READINGS OF THERMOMETERS.

CELSIUS, OR CENTIGRADE (C). RÉAUMUR (R). FAHRENHEIT (F).

C.	R.	F.	C.	R.	F.
—30	—24.0	—22.0	23	18.4	73.4
—25	—20.0	—13.0	24	19.2	75.2
—20	—16.0	— 4.0	25	20.0	77.0
—15	—12.0	+ 5 0	26	20.8	78.8
—10	— 8.0	14.0	27	21.6	80.6
— 5	— 4.0	23.0	28	22.4	82.4
— 4	— 3.2	24.8	29	23.2	84.2
— 3	— 2.4	26.6	30	24.0	86.0
— 2	— 1.6	28.4	31	24.8	87.8
— 1	— 0.8	30.2	32	25.6	89.6
			33	26.4	91.4
Freezing point of water.			34	27.2	93.2
			35	28.0	95.0
0	0.0	32.0	36	28.8	96.8
1	0.8	33.8	37	29.6	98.6
2	1.6	35.6	38	30.4	100.4
3	2.4	37.4	39	31.2	102.2
4	3.2	39.2	40	32.0	104.0
5	4.0	41.0	41	32.8	105.8
6	4.8	42.8	42	33.6	107.6
7	5.6	44.6	43	34.4	109.4
8	6.4	46.4	44	35.2	111.2
9	7.2	48.2	45	36.0	113.0
10	8.0	50.0	50	40.0	122.0
11	8.8	51.8	55	44.0	131.0
12	9.6	53.6	60	48.0	140.0
13	10.4	55.4	65	52.0	149.0
14	11.2	57.2	70	56.0	158.0
15	12.0	59.0	75	60.0	167.0
16	12.8	60.8	80	64.0	176.0
17	13.6	62.6	85	68.0	185.0
18	14.4	64.4	90	72.0	194.0
19	15.2	66.2	95	76.0	203.0
20	16.0	68.0	100	80.0	212.0
21	16.8	69.8			
22	17.6	71.6	Boiling point of water.		

Readings on one scale can be changed into another by the following formulæ, in which $t°$ indicates degrees of temperature:

Réau. to Fahr.

$$\frac{9}{4}t° \text{ R} + 32° = t° \text{ F}$$

Réau. to Cent.

$$\frac{5}{4}t° \text{ R} = t° \text{ C}$$

Cent. to Fahr.

$$\frac{9}{5}t° \text{ C} + 32° = t° \text{ F}$$

Cent. to Réau.

$$\frac{4}{5}t° \text{ C} = t° \text{ R}$$

Fahr. to Cent.

$$\frac{5}{9}\left(t° \text{ F} - 32°\right) = t° \text{ C}$$

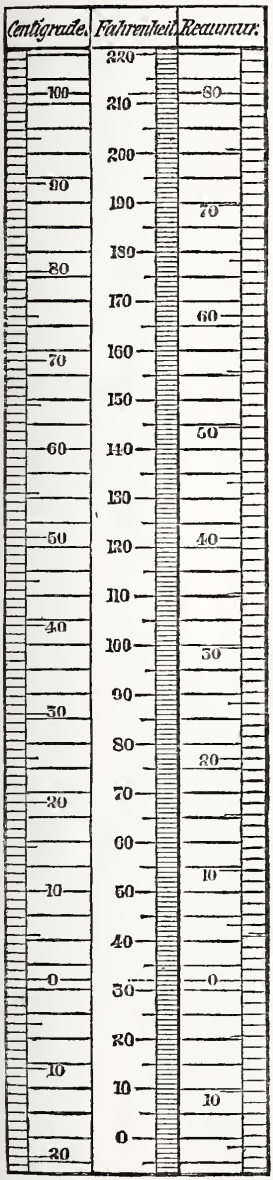
Fahr. to Réau.

$$\frac{4}{9}\left(t° \text{ F} - 32\right) = t° \text{ R}$$

Mrs. Mabel O. Wright, Photo.

"BUTTER IS COMING."

THERMOMETER SCALES.



SCALE FOR MEASURING DIAMETERS OF STOPS FOR LENSES.

Each cross line varies in length from the adjacent one by $\frac{1}{100}$th of an inch.

To use: Lay the stop flat on this scale, and select the cross line which is of the same length as the greatest diameter of the opening; read this off, by means of the figures, which will be the measurements in $\frac{1}{100}$ths of an inch. The equivalent focal length of lens, divided by this measurement of the stop opening, will give the fraction expressing the ratio of aperture to focal length. The rapidity of different lenses, or of the same lens with different stops, is proportional to the squares of these ratios.

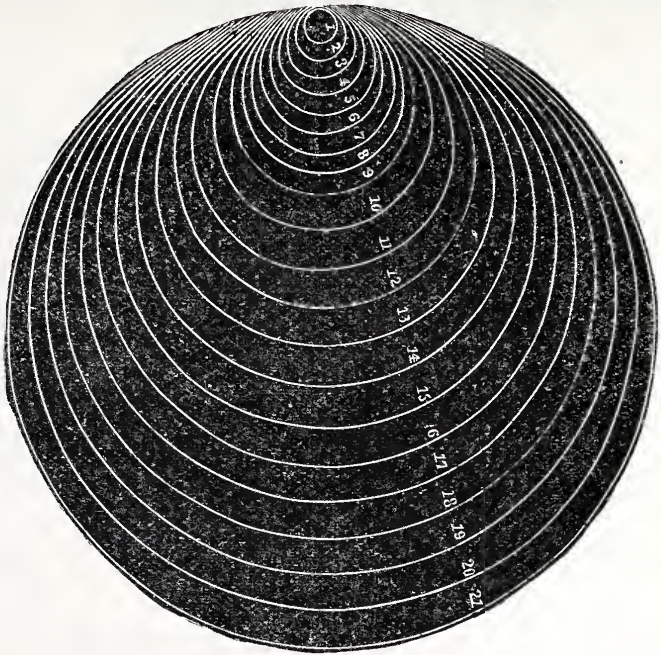
"UNIFORM SYSTEM" NUMBERS FOR STOPS FROM $\frac{f}{1}$ TO $\frac{f}{100}$.

In the following table Mr. S. A. Warburton has calculated the exposure necessary with every stop from $\frac{f}{1}$ to $\frac{f}{100}$ compared with the unit stop of the "uniform system" of the Photographic Society of Great Britain. The figures which are underlined show in the first column what $\frac{f}{a}$ must be in order to increase the exposure in geometrical ratio from $\frac{f}{4}$, the intermediate numbers showing the uniform system number for any other aperture.

f	U. S. No.	f	U. S. No.	f	U. S. No.
1	1/16	15	14.06	58	210.25
1¼	.097	16	16	59	217.56
1.414	⅛	17	18.06	60	225.00
1½	.140	18	20.25	61	232.56
1¾	.191	19	22.56	62	240.25
2	¼	20	25.00	63	248.06
2¼	.316	21	27.56	64	256
2½	.390	22	30.25	65	264.06
2.828	½	22.62	32	66	272.25
2¾	.472	23	33.06	67	280.56
3	.562	24	36.00	68	289.00
3¼	.660	25	39.06	69	297.56
3½	.765	26	42.25	70	306.25
3¾	.878	27	45.56	71	315.06
4	1.00	28	49.00	72	324.00
4¼	1.12	29	52.56	73	333.06
4½	1.26	30	56.25	74	342.25
4¾	1.41	31	60.06	75	351.56
5	1.56	32	64	76	361.00
5¼	1.72	33	68.06	77	370.56
5½	1.89	34	72.25	78	380.25
5.656	2	35	76.56	79	390.06
5¾	2.06	36	81.00	80	400.00
6	2.25	37	85.56	81	410.06
6¼	2.44	38	90.25	82	420.25
6½	2.64	39	95.06	83	430.56
6¾	2.84	40	100.00	84	440.00
7	3.06	41	105.06	85	451.56
7¼	3.28	42	110.25	86	462.25
7½	3.51	43	115.56	87	473.06
7¾	3.75	44	121.00	88	484.00
8	4	45	126.56	89	495.06
8¼	4.25	45.25	128	90	506.25
8½	4.51	46	132.25	90.50	512
8¾	4.78	47	138.06	91	517.56
9	5.06	48	144.00	92	529.00
9¼	5.34	49	150.06	93	540.56
9½	5.64	50	156.25	94	552.25
9¾	5.94	51	162.56	95	564.06
10	6.25	52	169.00	96	576.00
11	7.56	53	175.56	97	588.06
11.31	8	54	182.25	98	600.25
12	9.00	55	189.06	99	612.56
13	10.56	56	196.00	100	625.00
14	12.25	57	203.06		

THE PHOTOGRAPHIC SOCIETY'S (OF GREAT BRITAIN) STANDARD DIAPHRAGMS.

The annexed diagram and table are intended to facilitate the calculation of the proper number with which to mark the diaphragms according to the Photographic Society of Great Britain's Uniform System, which will be found described on another page. This number it is proposed to call the "U. S." (or uniform system number). The numbered circles in the diagram represent the sizes of stops. The photographer, knowing the equivalent focus of his lens, looks along the line opposite the number which represents the circle nearest inside to his diaphragm, and when he gets to the column headed by that equivalent focus the number there found is the U. S. number to be marked on the diaphragm. For example: A lens of eight inches equivalent focus has a diaphragm in size about No. 5 on the diaphragm; running the eye along the line opposite No. 5 we find in the column under—"focus eight inches" the No. 11, which is the U. S. number required.



No. of Circle.	4 focus	5 focus	6 focus	7 focus	8 focus	9 focus	10 focus	12 focus	14 focus
1	25	39	56						
2	11	17	25	34	44	56	68		
3	6¼	10	14	19	25	31	40	56	
4	4	6¼	9	12	16	20	25	36	48
5	2¾	4⅓	6¼	8½	11	14	17	25	34
6	2	3⅛	4½	6¼	8	10	13	18	25
7	1½	2½	3⅝	4¾	6	8	10	14	19
8	1¼	2	2¾	3¾	5	6¼	8	11	15
9	1	1½	2¼	3	4	5	6¼	9	12¼
10		1	1½	2⅛	2¾	3¼	4⅛	6	8½
11			1¼	1½	2	2½	3⅛	5	6
12			⅞	1⅛	1½	2	2½	3½	4¾
13				1	1¼	1⅚	1⅞	2¾	4
14					1	1¼	1⅝	2¼	3
15						1	1⅓	1⅞	2½
16							1	1⅝	2
17								1⅓	7⅞
18								1⅛	1½
19								1	1⅛
20									1⅛
21									1

Note.—This table, taken from the "British Journal Photographic Almanac," has proved to be very convenient in the calculating of stop values.

EQUATIONS RELATING TO FOCI.

The following simple optical formulas and calculations, worked out by Mr. J. A. C. Branfill, for the *British Journal Almanac*, will prove useful in many branches of photography, especially where several lenses of varying foci are in constant use for a variety of purposes:

p = Principal focus.
F = Greater conjugate focus.
f = Lesser conjugate focus.
r = Ratio of any dimension in original to the same dimensions in copy (in case of reduction), or *vice versa* (in case of enlargement).
a = Diameter of aperture to lens.
x = Exposure required, assuming that $x = 1$ when $a = \frac{p}{4}$.

$$p = \frac{r(F+f)}{(r+1)^2}$$

$$f = p\left(\frac{1+r}{r}\right) = \frac{F+f}{r+1}$$

$$F = p(r+1) = rf$$

$$F+f = p \times \frac{(r+1)^2}{r} = p\left(2 + r + \frac{1}{r}\right)$$

$$r = \frac{F-p}{p} = \frac{p}{f-p} = \frac{F}{f}$$

$$x = \frac{f^2}{16\,a^2}$$

N. B.—For ordinary landscape work, where r is greater than 20, x may be taken as $\frac{p^2}{16\,a^2}$

NOTE.—In case the above may not be clear to some photographers, the following rules may be better understood:

To find the principal focus of a lens (p), focus a near object in the camera, and measure the distance between it and the ground glass ($F+f$); next find the proportion which any dimension in the object bears to the same dimension on the ground glass (r). Thus, if the original dimension be four times as large as its reproduction, we say that r equals (=) 4. Multiply $F+f$ by r, and divide the product by the square of a number greater by one than r, that is by $(r+1)^2$. This rule was lately published by Mr. Debenham.

To find the lesser conjugate focus (f) (if p and r are known), multiply p by the sum of $r+1$ and divide the product by r. Or divide $F+f$ by $r+1$.

To find the greater conjugate focus (F) multiply p by $r+1$. Or multiply f by r.

To find $F+f$ (the distance which the ground glass should be from the object to be copied in order to get a given value for r) multiply p by the sum of $r + \frac{1}{r} + 2$.

To find r divide $F-p$ (the difference between F and p) by p. Or divide p by $f-p$. Or divide F by f.

To find x divide the square of f by 16 times the square of a (the diameter of aperture to lens).

For example Focus an object which is five inches high, so that it is one inch high on the ground glass; thus we know that $r = 5$. Next measure the distance between the object and the ground glass ($F+f$), which is found to be 45 inches.

Then $p = 45 \times$ (multiplied by) $5 \div$ (divided by) $6 \times 6 = 6\frac{1}{4}$ inches.
$f = 6\frac{1}{4} \times 6 \div 5 = 7\frac{1}{2}$ inches. Or $f = 45 \div 6 = 7\frac{1}{2}$ inches.
$F = 6\frac{1}{4} \times 6 = 37\frac{1}{2}$ inches. Or $F = 7\frac{1}{2} \times 5 = 37\frac{1}{2}$ inches.
$F+f = 6\frac{1}{4} \times (5 + \frac{1}{5} + 2) = 6\frac{1}{4} \times 7\frac{1}{5} = 45$ inches.
$r = (37\frac{1}{2} - 6\frac{1}{4}) \div 6\frac{1}{4} = 5$. Or $r = 6\frac{1}{4} \div (7\frac{1}{2} - 6\frac{1}{4}) = 5$.

And x (the exposure required) will be $7\frac{1}{2} \times 7\frac{1}{2} \div (16 \times \frac{9}{16}) = 6\frac{1}{4}$; that is, the exposure will be $6\frac{1}{4}$ times as much as the exposure required with an aperture whose diameter equals $p \div 4$, assuming the aperture (a) to be $\frac{3}{4}$ inch diameter.

FOCUSING SCALES FOR ANY LENS OF FROM 3 TO 12 INCHES EQUIVALENT FOCUS.

Drawn by W. T. Wintringham.

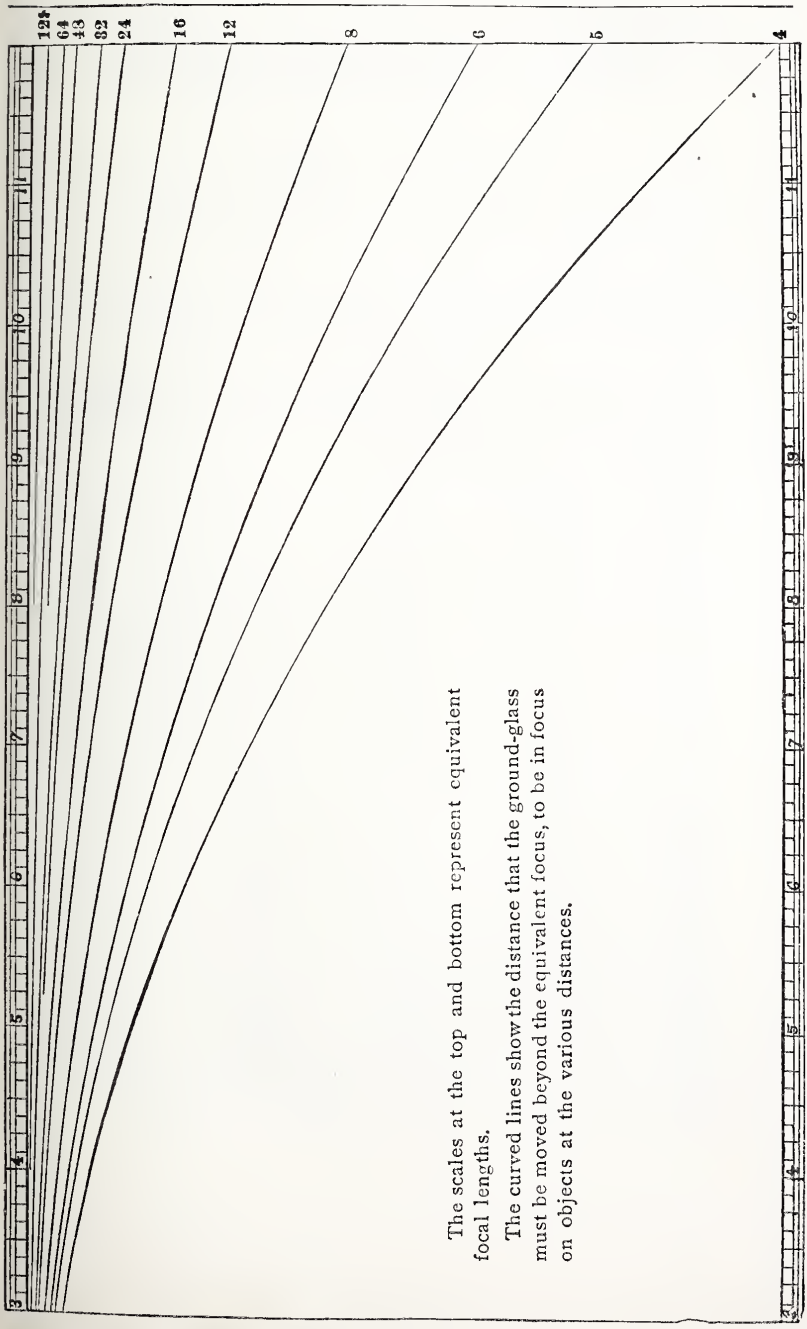


TABLE SHOWING DISPLACEMENT ON GROUND GLASS OF OBJECTS IN MOTION.

By HENRY L. TOLMAN.

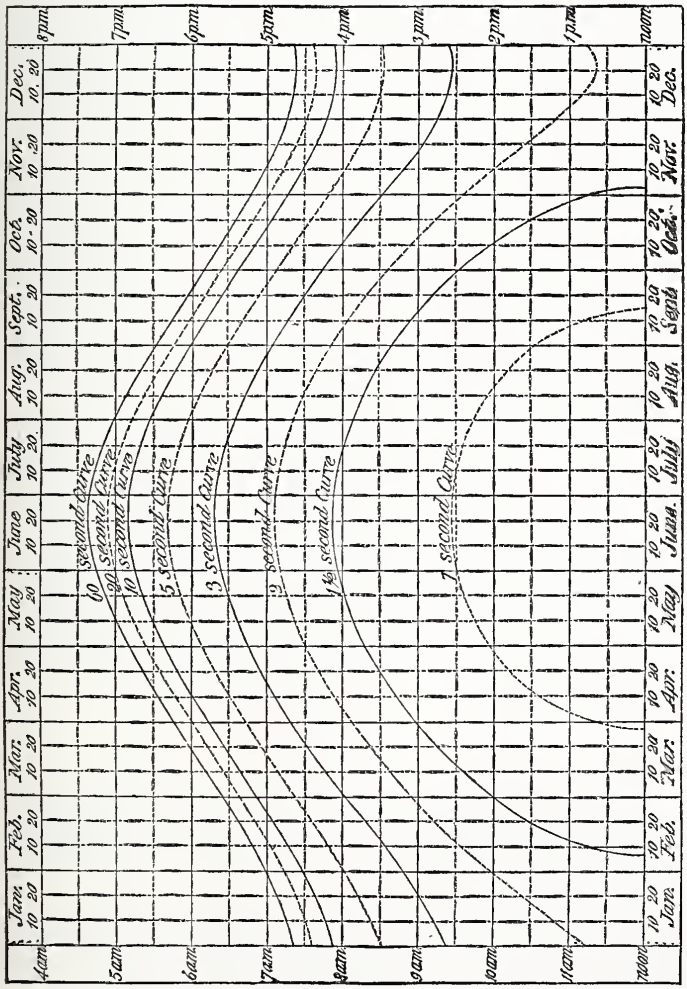
[Republished, with corrections, from the *Photographic Times.*]

Lens 6 in Equiv. Focus, Ground Glass at Principal Focus of Lens.

Miles per Hour.	Feet per Second.	Distance on Ground Glass, in inches, with Object 30 Feet away.	Same with Object 60 Feet away.	Same with Object 120 Feet away.
1	1½	.29	.15	.073
2	3	.59	.29	.147
3	4½	.88	.44	.220
4	6	1.17	.59	.293
5	7½	1.47	.73	.367
6	9	1.76	.88	.440
7	10½	2.05	1·03	.513
8	12	2 35	1.17	.587
9	13	2.64	1.32	.660
10	14½	2.93	1.47	.733
11	16	3.23	1.61	.807
12	17½	3.52	1.76	.880
13	19	3.81	1.91	.953
14	20½	4.11	2.05	1.027
15	22	4.40	2.20	1.100
20	29	5.87	2.93	1.467
25	37	7.33	3.67	1.833
30	44	8.80	4.40	2.200
35	51	10.27	5.13	2.567
40	59	11.73	5.97	2·933
45	66	13.20	6.60	3.300
50	73	14.67	7.33	3.667
55	80	16.13	8.06	4.033
60	88	17.60	8.80	4.400
75	110	22.00	11.00	5.500
100	147	29.33	14.67	7.333
125	183	36.67	18.33	9.167
150	220	44.00	22.00	11.000

DIAGRAM OF COMPARATIVE EXPOSURES.

Computed for the latitude of Washington, D. C. (38 deg., 54 min., N.)
By Lieut. Commander S. W. Very, U. S. N.



The straight lines in this diagram represent divisions of time; the vertical ones showing the month and day, and the horizontal ones the time of day as shown by a sun-dial.

The curved lines are curves of equal altitudes of the sun, computed for the latitude of Washington, for the year 1889.

The combination of the two systems of lines is designed to enable the photographer, whether amateur or professional, who has at some time determined the length of exposure required under certain circumstances of subject, clouds, lens, diaphragm, plate or film, etc., to decide what exposure to give *under the same circumstances*, at any time between sunrise and sunset, on any day of the year.

The diagram is based upon one constructed for the latitude of London, published in the *Photographic News*, in 1887, and reprinted in the ANNUAL of 1888, and the same standard of comparison is used in this adaptation—that is, such circumstances of subject, clouds, lens, diaphragm, plate or film, etc., as will require an exposure of one second, at noon of any day between the 4th of April and the 7th of September, or at any time between a quarter to ten in the forenoon and a quarter past two in the afternoon on the 21st of June.

The diagram, although constructed for the year 1889, and for the latitude of Washington, will serve equally well for any other year, and well enough for ordinary purposes, throughout the United States (exclusive of Alaska), although in the extreme Northern and Southern belts it will not be accurate.

The diagram is strictly accurate for "apparent time" only, but it is sufficiently so for "local mean time" (which may differ sixteen minutes from "apparent time"), and in the great majority of places for "standard time" (which in some places differs half an hour from "mean time," and may differ three-quarters of an hour from "apparent time").

EXAMPLES.

Q. With a certain lens, diaphragm, etc., it is found that on the 20th of July, at 9.30 A.M., a certain subject requires three seconds' exposure; what time should be given on the 10th of December, at 3.30 P.M., the subject, lens, etc., being the same?

A. Fifteen seconds.

Q. At noon of the 15th of May, a certain subject required ten seconds; what length of exposure should be given to the same subject, with the same lens, diaphragm, etc., on the 1st of November, at 8 A M.?

A. Forty-five seconds.

TABLE OF COMPARATIVE LIGHT VALUES.

By Rev. Dwight W. Smith.

While there is a wider range in timing the exposure of a dry plate than is generally supposed, yet it is well known that there is but one correct interval for the best results with a normal developer. To best approximate that interval at all available hours of the day and year requires some attention and experience. There was a time when plates of a given brand and sensitiveness were quite unreliable, but now that they are so uniform, and improving more and more in this direction, tables of light values that were found to be comparatively useless will now be found of increasing value. The subjoined table, based upon the diagram in this book, by Lieutenant S. W. Very, U. S. N., has been computed for the first half of each month, and at a glance one may obtain information that would otherwise require time and trouble, and that even skill and experience does not always provide for, especially during the time indicated in which there is a rapid loss of light. It will be seen that in January, the light value for noon is given as 1.7, while at 4 P.M. the exposure would necessarily be more than five times that duration. For July, the most rapid as well as longest available light of any month, the light at noon is indicated by .2 instead of 1.7, and at 3 P.M. more than twice the time will be required.

The first column indicates the hour of the day; the second column the comparative light values in whole numbers and tenths.

JANUARY.		FEBRUARY.		MARCH.		APRIL.	
8	10	8	6	8	3	8	2
9	4	9	4	9	2	9	1.5
10	2.5	10	2	10	1.5	10	1.7
11	2	11	1.7	11	1.2	11	1
12	1.7	12	1.5	12	1	12	1
1	1.7	1	2	1	1	1	1
2	2.5	2	2.7	2	1.7	2	1.2
3	4.5	3	3.5	3	2	3	1.5
4	9	4	5	4	4	4	2
		5	60	5	20	5	4
						6	20

MAY.		JUNE.		JULY.		AUGUST.	
8	1.7	8	1.7	8	1.5	8	1.7
9	1.2	9	1.2	9	1.2	9	1.5
10	1	10	1	10	1	10	1
11	.7	11	.6	11	.5	11	.7
12	.5	12	.3	12	.2	12	.5
1	.7	1	.5	1	.5	1	.5
2	1	2	.7	2	1	2	1
3	1.2	3	1.2	3	1.2	3	1.2
4	1.5	4	1.5	4	1.5	4	1.7
5	2.7	5	2.2	5	2.2	5	2.5
6	15	6	5	6	4	6	5
7	80	7	20	7	15	7	60

SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
8	2	8	3	8	4	8	9
9	1.5	9	1.7	9	3	9	3
10	1	10	1.5	10	2	10	2
11	1	11	1.2	11	1 7	11	1.5
12	.5	12	1	12	1.5	12	1.7
1	1	1	1.2	1	1.5	1	2
2	1.2	2	1.5	2	2	2	2.5
3	1.5	3	2	3	2.5	3	3.5
4	2	4	2.7	4	5	4	8
5	3	5	6	5	20	5	80
6	10	6	40	6	70		

PROF. BURTON'S TABLE OF COMPARATIVE EXPOSURES.

Apertures Calculated on the Standard System of the Photographic Society.	Sea and Sky.	Open Landscape.	Landscape with heavy foliage in foreground.	Under Trees, up to		Fairly Lighted Interiors.		Badly Lighted Interiors, up to		Portraits in bright diffused Light out of doors.	Portraits in good Studio Light.		Portraits in Ordinary Room.	
				mins.	secs.	mins.	secs.	hrs.	mins.		mins.	secs.	mins.	secs.
No. 1, or $\frac{f}{4}$	$\frac{1}{160}$ sec.	$\frac{1}{50}$ sec.	$\frac{1}{8}$ sec.	0	10	0	10	0	2	$\frac{1}{6}$ sec.	0	1	0	4
No. 2, or $\frac{f}{5.657}$	$\frac{1}{80}$ sec.	$\frac{1}{25}$ sec.	$\frac{1}{4}$ sec.	0	20	0	20	0	4	$\frac{1}{3}$ sec.	0	2	0	8
No. 4, or $\frac{f}{8}$	$\frac{1}{40}$ sec.	$\frac{1}{12}$ sec.	$\frac{1}{2}$ sec.	0	40	0	40	0	8	$\frac{2}{3}$ sec.	0	4	0	16
No. 8, or $\frac{f}{11.314}$	$\frac{1}{20}$ sec.	$\frac{1}{6}$ sec.	1 sec.	1	20	1	20	0	16	$1\frac{1}{3}$ sec.	0	8	0	32
No. 16, or $\frac{f}{16}$	$\frac{1}{10}$ sec.	$\frac{1}{3}$ sec.	2 secs.	2	40	2	40	0	32	$2\frac{2}{3}$ secs.	0	16	1	4
No. 32, or $\frac{f}{22.627}$	$\frac{1}{5}$ sec.	$\frac{2}{3}$ sec.	4 secs.	5	20	5	20	1	4	$5\frac{1}{3}$ secs.	0	32	2	8
No. 64, or $\frac{f}{32}$	$\frac{2}{5}$ sec.	$1\frac{1}{3}$ sec.	8 secs.	10	40	10	40	2	8	$10\frac{2}{3}$ secs.	1	4	4	16
No. 128, or $\frac{f}{45.255}$	$\frac{4}{5}$ sec.	$2\frac{2}{3}$ secs.	16 secs.	21	20	21	20	4	16	21 secs.	2	8	8	32
No. 256, or $\frac{f}{64}$	$1\frac{2}{5}$ sec.	$5\frac{1}{3}$ secs.	32 secs.	42	40	42	40	8	32	42 secs.	4	16	17	4

LANTERNISTS' READY REFERENCE TABLE.

(From Optical Magic Lantern Journal.)

If A=focal length of objective, B=diameter of slide, C=diameter of disc on screen, D=distance between objective and screen, then $D=\frac{C \times A}{B}$ $A=\frac{D \times B}{C}$ $C=\frac{D \times B}{A}$

The following table has been computed by these rules and will show by a glance the relations between the size of disc and distance from screen for object glasses of all foci from 4 inches to 15 inches. The diameter of slide is taken as 3 inches, that being the usual opening of the mat.

Distance between Lantern and Screen.	FOCUS OF LENS.																							
	4in.		5in.		6in.		7in.		8in.		9in.		10in.		11in.		12in.		13in.		14in.		15in.	
	DIAMETER OF DISC.																							
	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.
10 feet.	7	6	6	0	5	0	4	3	3	9	3	4	3	0	2	9	2	6	2	4	2	2	2	0
11 "	8	3	6	7	5	6	4	9	4	2	3	8	3	4	3	0	2	9	2	6	2	4	2	2
12 "	9	0	7	2	6	0	5	2	4	6	4	0	3	7	3	3	3	0	2	9	2	7	2	5
13 "	9	9	7	10	6	6	5	7	4	11	4	4	3	11	3	7	3	3	3	0	2	9	2	7
14 "	10	6	8	5	7	0	6	0	5	3	4	8	4	2	3	10	3	7	3	3	3	0	2	9
15 "	11	3	9	0	7	6	6	5	5	8	5	0	4	6	4	1	3	9	3	6	3	3	3	0
20 "	15	0	12	0	10	0	8	7	7	6	6	8	6	0	5	6	5	0	4	7	4	3	4	0
25 "	18	9	15	0	12	6	10	9	9	4	8	4	7	6	6	10	6	3	5	0	5	4	5	0
30 "	22	6	18	0	15	0	12	10	11	3	10	0	9	0	8	2	7	6	6	11	6	5	6	0
35 "	26	3	21	0	17	6	15	0	13	1	11	8	10	6	9	6	8	9	8	1	7	6	7	0
40 "	30	0	24	0	20	0	17	2	15	0	13	4	12	0	10	10	10	0	9	2	8	6	8	0
45 "	33	9	27	0	22	6	19	3	16	10	15	0	13	6	12	3	11	3	10	4	9	8	9	0
50 "	37	6	30	0	25	0	21	5	18	9	16	8	15	0	13	8	12	6	11	6	10	9	10	0

EXAMPLES.—An 8in. focus lens at a distance of 35ft. will give a disc of 13ft. 1in. To produce a disc of 12ft. with a lens of 10in. focus, the lantern and screen must be separated by 40ft. To produce a disc of 15ft. at a distance of 45ft. will require a lens of 9in. focus.

TABLE FOR ENLARGEMENT AND REDUCTION.

COMPUTED FOR CENTIMETERS OR INCHES.

Equivalent Focus of the Lens.	Distances of the Object and the Ground Glass Screen from the Center of the Objective.																								
	1 *t.*	2 *t.*	3 *t.*	4 *t.*	5 *t.*	6 *t.*	7 *t.*	8 *t.*	9 *t.*	10 *t.*	11 *t.*	12 *t.*	13 *t.*	14 *t.*	15 *t.*	16 *t.*	17 *t.*	18 *t.*	19 *t.*	20 *t.*	21 *t.*	22 *t.*	23 *t.*	24 *t.*	25 *t.*
5..	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130
	10	7.5	6.7	6.2	6	5.8	5.7	5.6	5.6	5.5	5.5	5.4	5.4	5.4	5.3	5.3	5.3	5.3	5.3	5.3	5.2	5.2	5.2	5.2	5.2
6..	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156
	12	9	8	7.5	7.2	7	6.9	6.8	6.7	6.6	6.5	6.5	6.5	6.4	6.4	6.4	6.4	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.2
7..	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147	154	161	168	175	182
	14	10.5	9.3	8.8	8.4	8.2	8	7.9	7.8	7.7	7.6	7.6	7.5	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.3	7.3	7.3	7.3	7.3
8..	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	168	176	184	192	200	208
	16	12	10.7	10	9.6	9.3	9.1	9	8.8	8.8	8.7	8.7	8.6	8.6	8.5	8.5	8.5	8.4	8.4	8.4	8.4	8.4	8.3	8.3	8.3
9..	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216	225	234
	18	13.5	12	11.3	10.8	10.5	10.3	10.1	10	9.9	9.8	9.8	9.7	9.6	9.6	9.6	9.5	9.5	9.5	9.5	9.4	9.4	9.4	9.4	9.4
10..	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260
	20	15	13.3	12.5	12	11.7	11.4	11.3	11.1	11	10.9	10.8	10.8	10.7	10.7	10.6	10.6	10.6	10.5	10.5	10.5	10.5	10.4	10.4	10.4
11..	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	187	198	209	220	231	242	253	264	275	286
	22	16.5	14.7	13.8	13.2	12.8	12.6	12.4	12.2	12.1	12	11.9	11.8	11.8	11.7	11.7	11.6	11.6	11.6	11.6	11.5	11.5	11.5	11.5	11.4
12..	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240	252	264	276	288	300	312
	24	18	16	15	14.4	14	13.7	13.5	13.3	13.2	13.1	13	12.9	12.9	12.8	12.7	12.7	12.7	12.6	12.6	12.6	12.5	12.5	12.5	12.5
13..	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325	338
	26	19.5	17.3	16.3	15.6	15.2	14.9	14.6	14.4	14.3	14.2	14.1	14	13.9	13.9	13.8	13.8	13.7	13.7	13.7	13.6	13.6	13.6	13.5	13.5
14..	28	42	56	70	84	98	112	126	140	154	168	182	196	210	224	238	252	266	280	294	308	322	336	350	364
	28	21	18.7	17.5	16.8	16.3	16	15.8	15.6	15.4	15.3	15.2	15.1	15	14.9	14.9	14.8	14.8	14.7	14.7	14.7	14.6	14.6	14.6	14.6
15..	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	375	390
	30	22.5	20	18.8	18	17.5	17.1	16.9	16.7	16.5	16.4	16.3	16.2	16.1	16	15.9	15.9	15.8	15.8	15.8	15.7	15.7	15.7	15.6	15.6

16..	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288	304	320	336	352	368	384	400	416
	32	24	21.3	20	19.2	18.7	18.3	18	17.8	17.6	17.5	17.3	17.2	17.1	17.1	17	16.9	16.9	16.8	16.8	16.8	16.7	16.7	16.7	16.6
17..	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306	323	340	357	374	391	408	425	442
	34	25.5	22.7	21.3	20.4	19.8	19.4	19.1	18.9	18.7	18.5	18.4	18.3	18.2	18.1	18.1	18	17.9	17.9	17.9	17.8	17.8	17.7	17.7	17.7
18..	36	54	72	90	108	126	144	162	180	198	216	234	252	270	288	306	324	342	360	378	396	414	432	450	468
	36	27	24	22.5	21.6	21	20.6	20.3	20	19.8	19.6	19.5	19.4	19.3	19.2	19.1	19.1	19	18.9	18.9	18.9	18.8	18.8	18.8	18.7
19..	38	57	76	95	114	133	152	171	190	209	228	247	266	285	304	323	342	361	380	399	418	437	456	475	494
	38	28.5	25.3	23.8	22.8	22.2	21.7	21.4	21.1	20.9	20.7	20.6	20.5	20.4	20.3	20.2	20.1	20.1	20	20	19.9	19.9	19.8	19.8	19.8
20..	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	520
	40	30	26.7	25	24	23.3	22.9	22.5	22.2	22	21.8	21.7	21.5	21.4	21.3	21.3	21.2	21.1	21.1	21	21	20.9	20.9	20.8	20.8
21..	42	63	84	105	126	147	168	189	210	231	252	273	294	315	336	357	378	399	420	441	462	483	504	525	546
	42	31.5	28	26.3	25.2	24.5	24	23.6	23.3	23.1	22.9	22.8	22.6	22.5	22.4	22.3	22.2	22.2	22.1	22.1	22	22	21.9	21.9	21.8
22..	44	66	88	110	132	154	176	198	220	242	264	286	308	330	352	374	396	418	440	462	484	506	528	550	572
	44	33	29.3	27.5	26.4	25.7	25.1	24.8	24.4	24.2	24	23.8	23.7	23.6	23.5	23.4	23.3	23.2	23.2	23.1	23	23	23	22.9	22.9
23..	46	69	92	115	138	161	184	207	230	253	276	299	322	345	368	391	414	437	460	483	506	529	552	575	598
	46	34.5	30.7	28.8	27.6	26.8	26.3	25.9	25.6	25.3	25.1	24.9	24.8	24.6	24.5	24.4	24 4	24.3	24.2	24.2	24.1	24	24	24	23.9
24..	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	504	528	552	576	600	624
	48	36	32	30	28.8	28	27.4	27	26.7	26.4	26.2	26	25.8	25.7	25.6	25.5	25.4	25.3	25.3	25.2	25.1	25.1	25	25	25
25..	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525	550	575	600	625	650
	50	37.5	33.3	31.3	30	29.2	28.6	28.1	27.8	27.5	27.3	27.1	26.9	26.8	26.7	26.6	26.5	26.4	26.3	26.3	26.2	26.1	26.1	26	26

The use of the above table will best be explained by illustrations;

To enlarge six times with a lens of 15 centimeters (or inches) focal length. We find in the table under 6 *t.* and opposite 15, the figures $\frac{105}{17.5}$, hence the object must be 17.5, and the screen 105 centimeters (or inches) from the centre of the lens.

To reduce eight times with a lens of 19 centimeters (or inches) focus, the object must be 171 and the screen 21.4 centimeters (or inches) from centre of lens.

The table can be formulated thus: Where p = focal length of lens, a = distance from ground-glass to centre of **lens and** b = distance from object to centre of lens, then $\frac{1}{a} + \frac{1}{b} = \frac{1}{p}$

AMERICAN, FRENCH, ENGLISH AND GERMAN MONEY.

American.	French.	English.	German.	American.	French.	English.	German.
dols. c.	*fr. c.*	*s. d.*	*m. pf.*	*dols. c.*	*fr. c.*	*s. d.*	*m. pf.*
0 01	0 05	0 0½	0 04		2 87.5		2 30
0 02	0 10	0 1	0 08	0 56	2 92	2 4	
	0 12.5		0 10		3 00		2 40
0 03	0 15	0 1½	0 12	0 58	3 02	2 5	
	0 20		0 16	0 60	3 12.5	2 6	2 50
0 04	0 21	0 2		0 62	3 23	2 7	
	0 25		0 20		3 25		2 60
0 05	0 26	0 2½		0 64	3 33	2 8	
0 06	0 31	0 3	0 25		3 37.5		2 70
	0 37.5		0 30	0 66	3 44	2 9	
0 08	0 42	0 4			3 50		2 80
	0 50		0 40	0 68	3 54	2 10	
0 10	0 52	0 5			3 62.5		2 90
0 12	0 62.5	0 6	0 50	0 70	3 65	2 11	2 92
0 14	0 73	0 7		0 72	3 75	3 0	3 00
	0 75		0 60	0 74	3 85	3 1	3 08
0 16	0 83	0 8			3 87.5		3 10
	0 87.5		0 70	0 76	3 96	3 2	
0 18	0 94	0 9			4 00		3 20
	1 00		0 80	0 78	4 06	3 3	
0 20	1 04	0 10			4 12.5		3 30
	1 12.5		0 90	0 80	4 17	3 4	
0 22	1 15	0 11			4 25		3 40
0 24	1 25	1 0	1 00	0 82	4 27	3 5	
0 25	1 30	1 0½	1 04	0 84	4 37.5	3 6	3 50
0 26	1 35	1 1	1 08	0 86	4 48	3 7	
	1 37.5		1 10		4 50		3 60
0 28	1 46	1 2		0 88	4 58	3 8	
	1 50		1 20		4 62.5		3 70
0 30	1 56	1 3		0 90	4 69	3 9	
	1 62.5		1 30		4 75		3 80
0 32	1 67	1 4		0 92	4 79	3 10	
	1 75		1 40		4 87.5		3 90
0 34	1 77	1 5		0 94	4 90	3 11	
0 36	1 87.5	1 6	1 50	0 96	5 00	4 0	4 00
0 38	1 98	1 7		1 00	5 21	4 2	4 16
	2 00		1 60	1 20	6 25	5 0	5 00
0 40	2 08	1 8		1 44	7 50	6 0	6 00
	2 12.5		1 70	1 68	8 75	7 0	7 00
0 42	2 19	1 9		1 92	10 00	8 0	8 00
	2 25		1 80	2 16	11 25	9 0	9 00
0 44	2 29	1 10		2 40	12 50	10 0	10 00
	2 37.5		1 90	2 64	13 75	11 0	11 00
0 46	2 40	1 11	1 92	2 88	15 00	12 0	12 00
0 48	2 50	2 0	2 00	3 84	20 00	16 0	16 00
0 50	2 60	2 1	2 08	4 80	25 00	20=£1	20 00
	2 62.5		2 10	9 60	50 00	£2	40 00
0 52	2 71	2 2		14 40	75 00	£3	60 00
	2 5		2 20	19 20	100 00	£4	80 00
0 54	2 81	2 3		24 00	125 00	£5	100 00

STANDARD OF FOREIGN COINS FOR CUSTOMS PURPOSES

As Proclaimed by the Director of the United States Mint, January 1, 1890, and Corrected to Date.

The Value of Imports for the Assessment of Duties is ascertained by converting Currency of Invoice into Money of the United States, as per following Table:

Country.	Unit of Currency.	Sign.	Value in U. S. Cur.
Argentine Republic	Peso=100 Centavos	$	.96.5
Austria-Hungary	Florin=100 Kreutzer	Fl.	.34.5
Azores	Milreis =100 Reis	Rs. $	.83.5
Belgium	Franc=100 Centimes	Frs.	.19.3
Bolivia	Boliviano =10 Reales	$	.69.8
Brazil	Milreis=1000 Reis	Rs. $	.54.6
British North America. *Ex. Newfoundland*	Dollars=100 Cents	$	1.00
Chili	Peso=100 Centavos	$	.91.2
China (*Haikwan*)	Tael=10 Mace	Tael.	1.14.8
Columbia, U. S. of	Peso=100 Centavos	$	.69 8
Costa Rica	Peso=100 Centavos	$	.69.8
Cuba	Peso=100 Centavos	$	.92.6
Denmark	Krone=100 Ore	Kr.	.26.8
Ecuador	Sucre=100 Centavos	$	.69.8
Egypt	Pound=100 Piastres	£	4.94.3
France	Franc=100 Centimes	Frs.	.19.3
Germany	Mark=10 Pfennige	Mks.	.23.8
Great Britain	Pound Sterling.=20 Shillings	£	4.86.65
Greece	Drachma=100 Lepta	Dr.	.19.3
Guatemala	Peso=100 Centavos	$	.69.8
Hayti	Gourde=100 Cents	$	.69.5
Honduras	Peso=100 Centavos	$	.69.8
India	Rupee=16 Annas	Rs.	.33.2
Italy	Lira=100 Centesimi	L.	.19.3
Japan	Yen =100 Sen Gold	Yen.	.99.7
do	do.= do. Silver	Yen.	.75.2
Liberia	Dollar=100 Cents	$	1.00
Mexico	Peso =100 Centavos	$	.75.8
Netherlands	Florin=100 Cents	$	.40.2
Newfoundland	Dollar=100 Cents	$	1.01.4
Nicaragua	Peso =100 Centavos	$	.69.8
Norway	Krone =100 Ore	Kr.	.26.8
Paraguay	Peso=100 Centavos	$	1.00
Peru	Sol =100 Centavos	$	.69.8
Porto Rico	Peso =100 Centavos	$	.92.5
Portugal	Milreis=1000 Reis	Rs. $	1.08
Russia	Rouble=100 Copecks	S. Ro.	.55.8
Salvador	Peso=100 Centavos	$	.69.8
Sandwich Islands	Dollar=100 Cents	$	1.00
Spain	Peseta=100 Centimos	Ptas.	.19.3
Sweden	Krone =100 Ore	Kr.	.26.8
Switzerland	Franc =100 Centimes	Frs.	.19.3
Tripoli	Mahbub=20 Piastres.	$	.62.9
Tunis	Piastre =16 Caroubs	Ptrs.	.11.8
Turkey	Piastre =30 Paras	Ptrs.	.04.4
Uruguay	Patacon =100 Centavos	$	.94.9
Venezuela	Bolivar=100 Centimos	Brs.	.14

USUAL SIZES OF FRENCH, GERMAN AND ITALIAN DRY PLATES.

French and German.		*Inches.*	Italian.		*Inches.*
6½x 9	Centimetres	2.5x 3.6	9x12	Centimetres	3.6x 4.7
9 x12	"	3.6x 4.7	12x16	"	4.7x 6.3
12 x15	"	4.7x 5.9	12x18	"	4.7x 7.2
13 x18	"	5.1x 7.0	13x18	"	5.1x 7.0
12 x20	"	4.7x 7.8	12x20	"	4.7x 7.8
15 x21	"	5.9x 8.2	18x24	"	7.0x 9.4
15 x22	"	5.9x 8.6	21x27	"	8.2x10.6
18 x24	"	7.2x 9.4	24x30	"	9.4x11.8
21 x27	"	8.2x10.6	27x33	"	10.6x12.9
24 x30	"	9.4x11.8	30x36	"	11.8x14.1
27 x33	"	10.6x12.9	40x50	"	15.7x19.6
27 x35	"	10.6x13.7	50x60	"	19.6x23.6
30 x40	"	11.8x15.7			
40 x50	"	15.7x19.6			
50 x60	"	19.6x23.6			

SIZES OF GLASS, MOUNTS, PAPER, ETC.

Petite cards	1⅝x3⅛
One-ninth plate	2 x2½
One-sixth plate	2¾x3¼
One-fourth plate	3¼x4¼
Half plate	4¼x5½ and 4¼x6½
Half plate (English)	4¾x6½
Whole plate (4–4)	6½x8½
Extra 4–4	8 x10

Other sizes are expressed by inches.

Sizes of Mounts.

Stereoscopic	3½x7, 4x7, 4¼x7, 4½x7, 5x8		
Victoria	3¼x5	Minette	1½x2⅜
Imperial	7⅞x9⅞	Card	2½x4⅛
Boudoir	5¼x8½	Cabinet	4¼x6½
Panel	4 x8¼	Promenade	4⅛x7⅛

Sizes of Albumen Paper.

18x22¾, 20½x24½, 22x36, 26x40, 27x42.

Size of blotting paper 19x24

FREEZING MIXTURES.

Parts.	Reducing the Temperature	From Degrees of the Celsius	To Thermometer.
3	Nitrate of sodium + 4 Water	+13.2 deg.	— 5.3 deg.
9	Phosphate of sodium + 4 dilute Nitric acid	+10 "	— 9 "
3	Sulphate of sodium + 2 dilute Nitric acid	+10 "	—10 "
1	Nitrate of sodium + 4 Water	.....	—10.6 "
1	Chloride of potassium + 4 Water	.....	—11.8 "
5	Sal ammoniac + 5 Saltpetre + 16 Water	+10 deg.	—12 "
1	Nitrate of ammonia + 1 Water	+10 "	—15.5 "
8	Sulphate of sodium + 5 conc. Sulphuric acid	+10 "	—17 "
1	Sulphocyanate of Potass. + 1 Water	+18 "	—21 "
1	Chloride of sodium + 3 Snow	.....	—21 "
1	Sal ammoniac + 1 Saltpetre + 1 Water	+ 8 deg.	—24 "
3	Crystal. chloride of calcium + 1 Snow	.....	—36 "
1	Snow + 1 dilute Sulphuric acid	— 5 deg.	—41

LIST OF THE PRINCIPAL CHEMICALS USED IN PHOTOGRAPHY, WITH ENGLISH, LATIN, GERMAN AND FRENCH NAMES.

COMPILED BY C. L. LOCHMAN.

ENGLISH.	LATIN.	GERMAN.	FRENCH.
Acid Acetic	Acidum aceticum	Essigsäure	Acide acetique.
" " Glacial	Acidum aceticum glaciale.	Eisessig	Vinaigre glacial.
" Chromic	Acidum chromicum	Chromsäure	Acide chromique.
" Citric	Acidum citricum	Citronensäure	Acide citrique.
" Gallic	Acidum gallicum	Gallussäure	Acide gallique.
" Hydrochloric	Acidum hydrochloricum.	Salzsäure	Acide chlorhydrique.
" *Muriatic.*			
" Nitric	Acidum nitricum	Salpetersäure	Acide nitrique (azotique).
" Oxalic	Acidum oxalicum	Oxalsäure	Acide oxalique.
" Pyrogallic; Pyrogallol.	Acidum pyrogallicum.	Pyrogallussäure; Pyrogallol.	Acide pyrogallique.
" Tartaric	Acidum tartaricum	Weinsteinsäure	Acide tartarique.
" Sulphuric	Acidum sulphuricum	Schwefelsäure	Acide sulfurique.
" Tannic; Tannin	Acidum tannicum.	Gerbsäure	Acide tannique.
Alcohol, Ethyl	Alcohol	Weingeist	Alcool.
Alcohol, Wood	Alcohol methylicum	Holzgeist	Alcool methylique.
Alum, Ammonia	Aluminii et ammonii sulphas.	Ammoniak-Alaun	Sulphate d'alumine et d'ammoniaque.
Alum, Chrome	Chromii et potassii sulphas.	Chrom-Alaun	Alun chromi-potassique.
Alum, Potassa	Aluminii et potassii sulphas	Kali-Alaun	Sulfate d'alumine et de potasse.
Ammonium Bichromate.	Ammonii bichromicum	Dobletchromsaures Ammon.	Bichromate d'ammoniaque.
Ammonium Nitrate	Ammonii nitras	Ammoniumnitrat	Azotate d'ammionaque
Benzin	Benzinum	Petroleumbenzin	Benzine.
Benzol	Benzolum	Benzol	Benzole.
Bromine	Bromum; Brominium	Brom	Brome.
Cadmium Bromide	Cadmii bromidum	Kadmiumbromid; Bromkadmium.	Bromure de cadmium.
Cadmium Iodide	Cadmii iodidum	Kadmiumjodid; Jodkadmium.	Iodure de cadmium.
Calcium Bromide	Calcii bromidum	Bromcalcium	Bromure de calcium.
" Carbonate	Calcii carbonas	Calciumcarbonat	Carbonate de calcium.
" Iodide	Calcii iodidum	Jodcalcium	Iodure de calcium.
Chloroform	Chloroformum	Chloroform	Choloforme.
Collodion	Collodium	Collodion	Collodion.
Dextrin	Dextrinum	Stärkegummi	Dextrine.
Eikonogen.	Eikonogen	Eikonogen	Eikonogen.
Ether (Sulphuric)	Aether (sulphuricus)	Aether; Schwefeläther	Ether sulfurique.
Gelatin	Gelatina	Gelatin	Gelatine.
Glycerin	Glycerinum	Glycerin	Glycerine.
Gold	Aurum	Gold	Or.
" Chloride,	Auri Chloridum	Goldchlorid	Chlorure d'or.
" and Sodium Chloride.	Auri et sodii chloridum	Natriumgoldchlorid	Chlorure d'or et de Sodium
Gum Arabic	Gummi Arabicum	Arabisches Gummi	Gomme Arabique.
Gum Sandarac	Sandaraca	Sandarak	Sandaraque.
Gum Shellac	Ressina lacca	Lack; Gummilack	Laque.
Hydrochinon; Hydroquinon.	Hydrochinonum	Hydrochinon	Hydrochinon.
Iodine	Iodum; Iodinium	Jod	Iode.
Iron Sulphate	Ferri sulphas	Ferrosulfat	Sulfate de fer.
Lithium Bromide	Lithii bromidum	Bromlithium	Bromure de lithium.
" Iodide	Lithii iodidum	Jodlithium	Iodure de lithium.
Magnesium Bromide	Magnesii bromidum	Brommagnesium	Bromure de magnesium
" Iodide	Magnesii iodidum	Jodmagnesium	Iodure de magnesium.
" Sulphate	Magnesii sulphas	Magnesiumsulfat	Sulfate de magnesie.
Mercury Bichloride	Hydrargyri bichloridum.	Aetzendes Quecksilber chlorid.	Deutochlorure de mercure.

LIST OF THE PRINCIPAL CHEMICALS, ETC.—*Continued.*

ENGLISH.	LATIN.	GERMAN.	FRENCH.
Oil of Lavender	Oleum Lavandulæ	Lavendelöl	Essence de Lavand.
Oil of Turpentine	Oleum Terebinthinæ	Terpintinöl	Essence Terebinthine.
Platinum Chloride	Platini chloridum	Platinchlorid	Perchlorure de platine
Platino-Potassium Chloride.	Platini et Potassii chloridum.	Kali-Platinumchlorid	Chlorure de platinum et de potassium.
Potassa, Sulphurated ; Lilver of Sulphur.	Potassa sulphurata	Schwefelleber	Sulfure de potasse.
Potassium Bichromate	Potassii bichromas	Kaliumbichromat	Bichromate de potasse
" Bromide	Potassii Bromidum	Kaliumbromid	Bromure de potassium
" Carbonate	Potassii carbonas	Kaliumcarbonat	Carbonate de potasse.
" Cyanide	Potassii cyanidum	Cyankalium	Cyanure de potassium.
" Ferricyanide	Potassii ferricyanidum	Ferridcyankalium	Ferricyanure de potassium.
" Ferrocyanide	Potassii ferrocyanidum	Ferrocyankalium	Ferrocyanure de potassium.
" Hydrate ; Potassa.	Potassii hydras ; Potassa.	Aetzkali	Potasse caustique.
" Iodide	Potassii iodidum	Jodkalium	Iodure de potassium.
" Oxalate, neutral.	Potassii oxalas	Kalium Oxalat, neutrales.	Oxalate de potasse neutre.
" Sulphite	Potassii sulphis	Kaliumsulfit	Sulfite de potassium.
" Sulphocyanide	Potassii sulphocyanidum.	Kalium sulfocyanat ; Rhodankalium.	Sulfocyanure de potassium.
Pyroxylin ; Gun Cotton.	Pyroxylinum	Collodionwolle ; Schiess-baumwolle.	Pyroxyle; Fulmi-coton
Silver	Argentum	Silber	Argent.
" Nitrate	Argenti nitras	Silbernitrat	Nitrate d'argent.
" Oxide	Argenti oxidum	Silber Oxyd	Oxyde d'argent.
Sodium Acetate	Sodii acetas	Natriumacetat	Acetate de soude.
" Biborate ; Borax.	Sodii biboras	Natrium borat; Borax.	Borate de soude.
" Bicarbonate	Sodii bicarbonas	Natriumbicarbonat	Bicarbonate de soude.
" Bromide	Sodii bromidum.	Bromnatrium	Bromure de sodium.
" Carbonate	Sodii carbonas	Natriumcarbonat	Carbonate de soude.
" Chloride	Sodii chloridum	Chlornatrium	Chlorure de sodium
" Citrate	Sodii citras	Natriumcitrat; Citronensaures Natron.	Citrate de soude.
" Hydrate ; Soda	Sodii hydras ; Soda	Aeznatron	Soude caustique.
" Hyposulphite or Thiosulphate.	Sodii hyposulphis.	Unterschwefligsaures Natron.	Hyposulphite de soude
" Iodide	Sodii iodidum	Jodnatrium	Iodure de sodium.
" Sulphite	Sodii sulphis	Natrium sulfit	Sulfite de soude.
" Tungstate	Sodii tungstas	Wolfraumsaures Natron.	Tungstate de soude.
Starch	Amylum	Stärke; Stärkmehl	Amidon.
Strontium Bromide	Strontii bromidum	Bromstrontium	Bromure de strontium.
" Chloride	Strontii chloridum	Chlorstrontium.	Chlorure de strontium.
" Iodide	Strontii iodidum	Jodstrontium	Iodure de strontium.
Tannin, see Tannic Acid.			
Turpentine, Crude or White.	Terebinthina communis	Geweiner Terpentin	Terebenthine commune.
Uranium Bromide	Uranii bromidum	Bromuranium	Bromure d'uranium.
Uranium Nitrate	Uranii nitras	Salpetersaures Uranoxyd.	Nitrate d'urane.
Water, Distilled	Aqua destillata	Destillirtes Wasser	Eau distillée.
Water of Ammonia	Aqua ammoniæ	Salmiakgeist ; Ammoniak-Flüssigkeit.	Eau d'ammoniaque.
Zinc Bromide	Znci bromidum	Zinkbromid ; Bromzink.	Bromure de zinc.
Zinc Chloride	Zinci chloridum	Chlorzink	Chlorure de zinc.
Zinc Iodide	Zinci iodidum	Zinkjodid ; Jodzink	Iodure de zinc.

PHOTOGRAPHIC SCHOOLS OF INSTRUCTION.

AMERICAN.

CHAUTAUQUA SCHOOL OF PHOTOGRAPHY, Headquarters, 423 Broome Street, New York. In the Summer months, Chautauqua Assembly Grounds, N. Y. Prof. Charles Ehrmann, *Instructor*. 1. *Corresponding Class*.—Printed Lessons ; Reading of Hand-books ; Instruction by Correspondence. 2. *Practicing Class*.—Practical Exercises in Field and Studio ; Theories ; Public Lectures ; Colloquies. 3. *Local Class, New York*.—Demonstration in Practical Photography ; Theory of Photo-chemical Processes ; Preparation of Photographic Chemicals. 4. *Corresponding Class* (*Second Course*).—Prescribed Reading ; Chemistry ; Optics ; Examination in all classes ; Diplomas.

ANN ARBOR UNIVERSITY, MICHIGAN. *Director*, Prof. A. B. Stevens. Theory and Practice ; Special Instructions in Photomicrography ; Lectures on Photo-mechanical Processes. It is obligatory for the students to have passed two courses in chemistry. Examination and Diplomas.

EUROPEAN.

PHOTOGRAPHICAL LABORATORY OF THE POLYTECHNICUM IN CHARLOTTENBURG, BERLIN. Prof. Schlichting, *Director*. Prof. Dr. H. W. Vogel, *Instructor*. Chemistry, Physics, Drawing, Practical Exercises and Photo-mechanical Printing Methods.

BRAUNSCHWEIG DEPARTMENT OF POLYTECHNICAL SCHOOL. Prof. Dr. C. Koppe and Dr. Max Muller. Theory and Practice ; Photo-micrography ; Photo-grammetry.

KARLSRUHE. Prof. Dr. Schuberg. Theory and Practice in Studio and Field ; Lectures.

MUNICH. Dr. M. Th. Edmann. Photography Applied to the Mechanical Arts.

SCHLOSS GRÖNENBACH, BAVARIA. W. Cronenberg. Mechanical Printing Methods ; Wet and Dry Processes.

VIENNA IMPERIAL POLYTECHNICUM. Prof. Dr. Joseph M. Eder. Elements of Photography and Photo-chemistry ; Reproduction Methods.

VIENNA IMPERIAL INSTITUTE FOR PHOTOGRAPHIC PRACTICE, REPRODUCTION METHODS, AND MECHANICAL PRINTING. Prof. Dr. Joseph M. Eder, *Director*. Profs. Hans Lenhardt, Alex. Lainer, I. Hörwarter, C. Jasper, *Instructors*. Two Courses of Instruction. Drawing ; Chemistry ; Optics ; Theories of Photographic Processes ; Retouching Positives.

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SWEDISH.

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ITALIAN.

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LA FOTOGRAFIA SECONDO I PROCESSI MODERNI, von Dr. Gioppi, 2. Auflage. Milano, U. Hoepli.

POLISH.

POZEWODNIK FOTOGRAFICZNY DLA UZYTKY FOTOGRAFÓW ZAWODOWYCH I MILOSNIKÓW. T. Szajnok. Liczne ilustracye. Berl. 1892.

UNITED STATES PATENTS.

SUITS for redress on account of infringement of patents are brought in the United States Circuit Court for the District where the defendant resides. Redress may be had through an injunction preventing further infringement and an accounting of the damages caused the patentee, or the profits, gains or advantages made by the infringer.

Until recently appeals from decisions rendered by the United States Circuit Court were necessarily taken to the Supreme Court of the United States, and, owing to the great amount of business done by the latter, a delay of at least four years was suffered by an appellee.

A new special Court, designated the Circuit Court of Appeals, has been provided. Appeals may hereafter be taken to this Court, and are likely to be reached and disposed of quite expeditiously. This is of particular advantage to patentees, in view of the fact that their monopolies run but a limited time.

Patents are issued in the name of the United States and under the seal of the Patent Office to any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application, unless the same is proved to have been abandoned; and by any person who, by his own industry, genius, efforts, and expense, has invented and produced any new and original design for a manufacture, bust, statue, alto-relievo, or bas-relief; any new and original design for the printing of woolen, silk, cotton, or other fabrics, any new and original impression, ornament, pattern, print, or picture to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture; or any new, useful, and original shape or configuration of any article of manufacture, the same not having been known nor used by others before his invention or production thereof, nor patented nor described in any printed publication, upon payment of the fees required by law and other due proceedings had.

Joint inventors are entitled to a joint patent; neither can claim one separately. Independent inventors of distinct and independent improvements in the same machine can not obtain a joint patent for their separate inventions; nor does the fact that one furnishes the capital and another makes the invention entitle them to make application as joint inventors; but in such case they may become joint patentees.

Every patent contains a grant to the patentee, his heirs or assigns, for the term of seventeen years, of the exclusive right to make, use, and vend the invention or discovery throughout the United States and the Territories, referring to the specification for the particulars thereof.

If it appear that the inventor, at the time of making his application, believed himself to be the first inventor or discoverer, a patent will not be refused on account of the invention or discovery, or any part thereof, having been known or used in any foreign country before his invention or discovery thereof, if it had not been before patented or described in any printed publication.

Letters Patent granted a foreign government will not, while in force, prevent the inventor from obtaining a patent in the United States, unless the invention shall have been introduced into public use into the United States more than two years prior to the application. But every patent granted for an invention which is the subject of Letters Patent still in

force and previously granted to the same inventor in a foreign country will be so limited as to expire at the same time with such foreign patent, or, if there be more than one, at the same time with the one having the shortest unexpired term, but in no case will it be in force more than seventeen years.

Applications.

Application for a patent must be made in writing to the Commissioner of Patents. The applicant must also file in the Patent Office a written description of the same, and of the manner and process of making, constructing, compounding, and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound and use the same; and in case of a machine, he must explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions, and particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery. The specification and claim must be signed by the inventor and attested by two witnesses.

The applicant shall make oath that he verily believes himself to be the original and first inventor or discoverer of the art, machine, manufacture, composition, or improvement for which he solicits a patent; that he does not know and does not believe the same was ever before known or used, and shall state of what country he is a citizen. Such oath may be made before any person within the United States authorized by law to administer oaths, or, when the applicant resides in a foreign country, before any minister, charge d'affaires, consul, or commercial agent holding commission under the Government of the United States, or before any notary public of the foreign country in which the applicant may be.

When the nature of the case admits of drawings, the applicant must furnish one copy signed by the inventor or his attorney in fact, and attested by two witnesses, to be filed in the Patent Office. In all cases which admit of representation by model, the applicant, if required by the Commissioner, shall furnish a model of convenient size to exhibit advantageously the several parts of his invention or discovery.

On the filing of such application and the payment of the fee required by law, if, on such examination, it appears that the claimant is justly entitled to a patent under the law, and that the same is sufficiently useful and important, the Commissioner will issue a patent therefor.

Assignments.

Every patent or any interest therein shall be assignable in law by an instrument in writing; and the patentee, or his assigns or legal representatives may, in like manner, grant and convey an exclusive right under his patent to the whole or any specified part of the United States.

Reissues.

A reissue is granted to the original patentee, his legal representatives, or the assignees of the entire interest when, by reason of a defective or insufficient specification, or by reason of the patentee claiming as his invention or discovery more than he had a right to claim as new, the original patent is inoperative or invalid, provided the error has arisen from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention. The applications must be made and the specification sworn to by the inventors, if they be living.

Caveats.

A caveat under the patent law is a notice given to the Office of the caveator's claim as inventor, in order to prevent the grant of a patent to another for the same alleged invention upon an application filed during the life of the caveat without notice to the caveator.

Any citizen of the United States who has made a new invention or discovery, and desires further time to mature the same, may, on payment of a fee of $10, file in the Patent Office a caveat setting forth the object and the distinguishing characteristics of the invention, and praying protection of his right until he shall have matured his invention. Such caveat shall be filed in the confidential archives of the Office and preserved in secrecy, and shall be operative for the term of one year from the filing thereof.

An alien has the same privilege, if he has resided in the United States one year next preceding the filing of his caveat, and has made oath of his intention to become a citizen.

The caveat must comprise a specification, oath, and, when the nature of the case admits of it, a drawing, and, like the application, must be limited to a single invention or improvement.

Fees.

Fees must be paid in advance, and are as follows: On filing each original application for a patent, $15. On issuing each original patent, $20. In design cases: For three years and six months, $10; for seven years, $15; for fourteen years, $30. On filing each caveat, $10. On every application for the reissue of a patent, $30. On filing each disclaimer, $10. For certified copies of patents and other papers, including certified printed copies, ten cents per hundred words. For recording every assignment, agreement, power of attorney, or other paper, of three hundred words or under, $1; of over three hundred and under one thousand words, $2; of over one thousand words, $3. For copies of drawings, the reasonable cost of making them.

COPYRIGHT LAW OF THE UNITED STATES.

The author, inventor, designer, or proprietor of any book, map, chart, dramatic or musical composition, engraving, cut, PRINT, or PHOTOGRAPH, or NEGATIVE THEREOF or of a painting, drawing, chromo, statue, statuary, and of models or designs intended to be perfected as works of the fine arts, and the executors, administrators, or assigns of any such person, may secure to himself the sole liberty of printing, publishing, completing, copying, and vending the same, and, if a dramatic composition, of publicly performing or representing it, or causing it to be performed or represented by others.

Foreigners as well as citizens of the United States are, by a law which came into effect on July 1st, 1891, entitled to copyrights in this country, providing the nations of which they are citizens permit to United States citizens the benefit of copyright on the same basis as their own citizens, or such nation is a party to an international agreement providing for reciprocity in copyright to which the United States may become a party. Up to the present time, Great Britain, France, Belgium, Switzerland and Canada are the only foreign nations whose citizens are entitled to copyrights in this country.

Every applicant for a copyright must state distinctly the name and residence of the claimant, and whether right is claimed as author, designer, or proprietor. No affidavit or formal application is required.

A *printed* copy of the title (besides the two copies to be deposited after publication) of the book, map, chart, dramatic or musical composition, engraving, cut, print, or photograph, or a *description* of the painting, drawing, chromo, statue, statuary, or model or design for a work of the fine arts, for which copyright is desired, must be sent by mail or otherwise, *prepaid*, addressed "LIBRARIAN OF CONGRESS, WASHINGTON, D. C." This must be done before publication of the book or other article.

The *printed title* required may be a copy of the title-page of such publications as have title-pages. In other cases, the title must be printed expressly for copyright entry, with name of claimant of copyright. The style of type is immaterial, and the print of a type-writer will be accepted. But a separate title is required for each entry, and *each* title must be printed on paper as large as commercial note. The title of a *periodical* must include the date and number.

FEES.

The legal fee for *recording* each copyright claim is 50 cents, and for a *copy* of this record (or certificate of copyright) an addtional fee of 50 cents is required. Certificates covering more than one entry are not issued.

Not later than the day of publication of each book or other article, in this country or abroad, two complete copies of the best edition issued must be sent, to perfect the copyright, with the address "LIBRARIAN OF CONGRESS, WASHINGTON, D. C." The postage must be prepaid, or else the publications enclosed in parcels covered by printed Penalty labels, furnished by the Librarian, in which case they will come FREE by mail without limit of weight, according to rulings of the Post Office Department. Without the deposit of copies above required the copyright is void, and a penalty of $25 is incurred. No copy is required to be deposited elsewhere.

NOTICE OF COPYRIGHT.

A copy of the record (or duplicate certificate) of any copyright entry will be furnished, under seal, at the rate of 50 cents each.

No copyright is valid unless notice is given by inserting in every copy published, on the title-page or the page following, if it be a book; or, if a map, chart, musical composition, print, cut, engraving, photograph, painting, drawing, chromo, statue, statuary, or model or design intended to be perfected as a work of the fine arts, by inscribing upon some portion thereof, or on the substance on which the same is mounted, the following words, viz.: "*Entered according to Act of Congress, in the year* ——, *by*——, *in the office of the Librarian of Congress, at Washington*," or, at the option of the person entering the copyright, the words: "*Copyright*, 18—, *by*——."

The law imposes a penalty of $100 upon any person who has not obtained copyright who shall insert the notice, "*Entered according to Act of Congress*," or "*Copyright*," etc., or words of the same import, in or upon any book or other article.

TRANSLATIONS AND DRAMATIZATIONS.

Any author may reserve the right to translate or dramatize his own work. In this case notice should be given by printing the words "*Right of translation reserved*," or "*All rights reserved*," below the notice of copyright entry, and notifying the Librarian of Congress of such reservation, to be entered upon the record.

Since the phrase *all rights reserved* refers exclusively to the author's right to dramatize or to translate, it has no bearings upon any publications except original works, and will not be entered upon the record in other cases.

Duration of Copyright.

The original term of copyright runs for twenty-eight years. *Within six months before* the end of that time, the author or designer, or his widow or children, may secure a renewal for the further term of fourteen years, making forty-two years in all. Applications for renewal must be accompanied by explicit statement of ownership, in the case of the author, or of relationship, in the case of his heirs, and must state definitely the date and place of entry of the original copyright. Advertisement of renewal is to be made within two months of date of renewal certificate, in some newspaper, for four weeks.

Assignments.

A copyright is assignable in law by any instrument of writing, but such assignment must be recorded in the office of the Librarian of Congress within sixty days from its date. The fee for this record and certificate is $1, and for a certified copy of any record of assignment, $1.

Serials or Separate Publications.

In the case of books published in more than one volume, or of periodicals published in numbers, or of engravings, photographs, or other articles published with variations, a copyright is to be entered for each volume or part of a book, or number of a periodical, or variety, as to style, title, or inscription of any other article. But a book published serially in a periodical under the same general title, requires only one entry. To *complete* the copyright on such a work, two copies of each serial part, as well as of the complete work (if published separately), must be deposited.

Works of Art.

To secure a copyright for a painting, statue, or model or design intended to be perfected as a work of the fine arts, a definite description must accompany the application for copyright, and a photograph of the same as large as cabinet size mailed to the Librarian of Congress not later than the day of publication of the work or design.

Copyrights cannot be secured through the Librarian of Congress upon trade-marks, nor upon mere names of companies or articles, nor upon prints or labels intended to be used with any article of manufacture. If protection for such names is desired, application must be made to the Patent Office, where they are registered at a fee of $25 for trade-marks.

RECORD OF PHOTOGRAPHIC PATENTS.

Issued by the United States Patent Office from July 12th, 1892, to August 29th, 1893, Inclusive, with the Names of Patentees.

Compiled by F. C. Beach.

478,663.—Photographic Printing Machine.
John Uric, Jr., Jersey City, N. J.

478,739.—Illuminating Lens.
L. E. Davenport, New York, N. Y.

478,780.—Photographic Camera.
Wm. H. Bristol, Hoboken, N. J.

478,837.—Photographic Camera.
Hiram A. Benedict, New York, N. Y.

478,887.—Stand for Exhibiting Pictures.
V. L. M. Renard, Paris, France.

478,909.—Camera Shutter.
Thos. H. Blair and Fred. H. Kelley, Boston, Mass.

479,000.—Tripod.
O. H. Hanenstein, Buffalo, N. Y.

479,186.—Photographic Holder.
Jas. H. Hare, Brooklyn, N. Y.

479,305.—Manufacture of Photographic Films.
Henry M. Reichenbach, Rochester, N. Y.

479,587.—Magazine Camera.
Stephen C. Fay and Henry Willis, Rochester, N. Y.

479,664.—Tray.
Max S. Rosenzweig, New York, N. Y.

479,667.—Photographic Album.
Gustave Schwab, New York, N. Y.

480,808.—Camera Attachment.
Edmund De Moulin, Greenville, Ill.

480,822.—Folding Support for Head-Rests and the like.
Thos. Mayes, Albany, N. Y.

480,995.—Camera Shutter.
Wm. H. Bristol, Hoboken, N. J.

481,343.—Camera Shutter.
Wm. H. Bristol, Hoboken, N. J.

481,802.—Plate Attachment for Cameras.
GEO. L. MINEAR, Ottumwa, Ia.

482,002.—Photographic Background Holder.
ALVIN C. CASWELL, Fitchburg, Mass.

482,238.—Attachment for Stereopticons, Magic Lanterns, etc.
H. W. FORCE, Newburgh, N. Y.

482,854.—Photographic Shutter.
JOHN E. THORNTON, Manchester, England.

482,978.—Support for Photographs, Pictures, and analogous articles.
ANDREW HUNTER, Chicago, Ill.

483,135.—Diaphragm for Photographic Lenses.
EDGAR R. BULLARD, Wheeling, W. Va.

483,606.—Device for Modifying and Controlling Rays of Light for Photographic Purposes.
AMASA P. FLAGLOR, San Francisco, Cal.

483,688.—Photographic Camera.
FREDERICK A. HETHERINGTON, Indianapolis, Ind.

484,165.—Photographers' Background Holder.
WM. J. SCANDLIN, Brooklyn, N. Y.

484,175.—Photographic Printing Frame.
FREDERICK O. BYNOE, London, England.

484,179.—Finder Attachment for Cameras.
WM. B. COGGSWELL, Syracuse, N. Y.

484,456.—Camera Shutter.
HENRY C. PLATT, Nantucket, Mass.

484,569.—Photographic Plate-Holder.
ARTHUR M. PIERCE, Brooklyn, N. Y.

484,615.—Optometer.
JACOB S. SHERMAN, Cassopolis, Mich.

484,699.—Photographic Dark-Chamber.
ISAAC BRYNER, Callaway, Neb.

484,854.—Magic Lantern.
E. I. S. HART, New York, N. Y.

485,393.—Film-Holders for Cameras.
GUSTAVE D. MILBURN, Rochester, N. Y.

485,567.—Coin-Controlled Stereoscope.
JOHN RINGEN, St. Louis, Mo.

486,758.—Clip for Use in Photographic Copying.
ALOIS DELUG, Munich, Germany.

486,170.—Implement for Withdrawing Photograph Cards from Album Leaves.
WM. R. VANSANT, Philadelphia, Pa.

486,236.—Magic Lantern's Kiosk.
F. S. PIERLING, Munich, Germany.

486,397.—Camera Shutter.
GEO. EASTMAN, Rochester, N. Y.

486,748.—Photograph Display Rack.
JULIUS H. ABRAM, Akron, O.

486,831.—Flash-Light Apparatus.
J. B. LAWSON, Philadelphia, Pa.

486,913.—Apparatus for Photographic Printing.
HARRY E. TALLMAN, Cleveland, O.

487,159.—Camera.
ROBT. A. RIPLEY, Stamford, Conn.

487,262.—Registering Device for Photographic Cameras.
JOHN J. GEIGER, SR., Chicago, Ill.

487,295.—Camera Tripod.
JOS. RHODES, San Diego, Cal.

487,520.—Photographic Roll-Holder.
THOS. S. GILETTE; Evanston, Ill.

487,833.—Camera Shutter.
JOHN W. GRANTLAND, Philadelphia, Pa.

487,937.—Photographic Printing Apparatus and Process.
ULYSSES S. RUSH, Tacoma, Wash.

488,042.—Picture Exhibitor.
ALFRED SVENSON, Rockford, Ill.

488,134.—Picture Exhibitor.
DAVID I. ROGERS, Lebanon, Ky.

488,331.—Combined Camera and Photograph Exhibitor.
WM. V. ESMOND, Chicago, Ill.

488,705.—Photographic Negative Retoucher.
ALBERT J. BENNETT, Woonsocket, R. I.

488,799.—Photographic Camera.
WM. SANDERS, Liverpool, England.

488,810.—Photographic Camera.
SALOMON HIRSCHFELDER, Munich, Germany.

488,299.—Burner for Rolls of Burnishing Machines.
P. S. GEORGE, JR., Philadelphia, Pa.

489,512.—Plate-Holder Attachment for Cameras.
BYRON L. TURNER, Pittsford, Mich.

489,713.—Photograph Exhibitor.
ROBT. H. NELSON and THOS. H. TEMPLE, Ridgeway, Mich.

490,031.—Camera Shutter.
EUSEBIUS J. MOLERA, San Francisco, Cal.

490,059.—Photograph Holder.
GEO. M. BAINBRIDGE, Toronto, Canada.

490,117.—Camera.
WM. S. LAIGHTON and A. P. HITCHCOCK, Norwich, Conn.

490,180.—Coin-Operated Photograph Machine.
PIERRE V. W. WELSH, New York, N. Y.

491,171.—Retouching Device.
ALBERT S. HARRY, Steubenville, O.

491,619.—Photographic Fixing and Washing Tank.
ALFRED R. WARD, Toronto, Canada.

491,920.—Photographic Camera.
THOS. H. BLAIR and FRED. H. KELLEY, Boston, Mass.

491,921.—Camera Shutter.
THOS. H. BLAIR and FRED. H. KELLEY, Boston, Mass.

492,025.—Photographic Camera.
ANDREW KLAY, Bluffton, O.

492,149.—Photograph Exhibitor.
JOHN DEWÉ, London, England.

492,245.—Magnetic Retouching Tool.
JACOB F. STANDIFORD, Muscogee, Ind. Terr.

492,333.—Screen for Photo-Mechanical Printing.
LOUIS E. and MAX LEVY, Philadelphia, Pa.

492,335.—Photographic Objective.
ALBERT B. PARVIN, Philadelphia, Pa.

492,354.—Film Measuring and Cutting Device.
FREDERICK J. HARRISON, Brooklyn, N. Y.

492,642.—Registering Device for Photographic Cameras.
PAUL TOURNACHON, Paris, France.

492,696.—Photographic Camera.
ENOCH W. PERRY, JR., New York, N. Y.

492,703.—Photographic Camera.
JOS. ZENK, Schlüsselfeldt, Germany.

493,365.—Ground-Glass Adjuster for Cameras.
GARRETT W. LOW and WM. SHAKESPEARE, JR., Kalamazoo, Mich.

493,426.—Apparatus for Exhibiting Photographs of Moving Objects.
THOS. A. EDISON, Llewellyn Park, N. J.

493.747.—Photographic Camera.
HIRAM A. BENEDICT, Brooklyn, N. Y.

494,022.—Photographic Printing Device.
WILHELM OHSE, Dessau, Germany.

494,097.—Photographic Camera.
JOS. A. Davison, Polo, Chicago, Ill.

494,128.—Lens for Cameras.
ERSKINE DECKER, Cassopolis, Mich.

494,164.—Magazine Camera.
ROBT. F. RICE, Hartford, Conn.

494,256.—Camera Shutter.
WM. H. LEWIS, Huntington, N. Y.

494,306.—Photographic Film.
THOS. SAULT, New Haven, Conn.

494,354.—Photographic Camera.
J. M. TRACEY and G. S. HODGES, Orchard Lake, Mich.

494,400.—Photographic Camera.
ABRAHAM VANDERBEEK, Hartford, Conn.

494,401.—Tripod or Stand for Camera or other purposes.
ABRAHAM VANDERBEEK, Hartford, Conn.

494,517.—Photographic Camera.
WM. A. ARMSTRONG, Milwaukee, Wis.

494,526.—Process for Making Transparent Photographs on Glass.
FRANCIS R. FORSTER, New York, N. Y.

494,853.—Lime Jet and Hood for Magic Lanterns.
CHAS. GOODYEAR, JR., New York, N. Y.

494,854.—Magic Lantern.
CHAS. GOODYEAR, JR., New York, N. Y.

494,855.—Magic Lantern Lens.
CHAS. GOODYEAR, JR., New York, N. Y.

495,066.—Photographic Camera Shutter.
WM. SHAKESPEARE, JR., and GARRETT W. LOW, Kalamazoo, Mich.

495,102.—Photograph Dryer.
LEWIS A. REID, Harvard, Ill.

495,341.—Photogravure Printing Plates.
FREDERIC E. IVES, Philadelphia, Pa.

495,466.—Device for Securing Zinc or other Printing Plates.
EDWARD S. JONES, Providence, R. I.

495,566.—Photographic Camera.
ROBT. F. RICE, Hartford, Conn.

496,356.—Photographic Shutter.
JOHN W. GRANTLAND, Philadelphia, Pa.

496,512.—Camera Shutter.
ALEXANDER ENTWISTH, Bristol, R. I.

496,851.—Tripod.
WM. BUNKER, New York, N. Y., and LOUIS W. BUTLER, Brooklyn, N. Y.

496,976.—Photograph Album.
RUDOLPH M. HUNTER, Philadelphia, Pa.

497,042.—Tripod.
W. WARREN, Pottsville, Pa.

497,525.—Photographic Magazine Camera.
GUSTAVE D. MILBURN, Rochester, N. Y.

497,691.—Photographic Printing Frame.
JULIUS SHUTTING, Nashville, Tenn.

497,779.—Tripod.
T. F. FARRELL, Niagara Falls, N. Y.

497,884.—Photographic Negative Ribbon for Camera Boxes.
HUGO C. H. KRAUSE and HERRMANN B. SCHNEIDER, Chicago, Ill.

497,914.—Phototype Machine.
ARTHUR C. FERGUSON, Saratoga Springs, N. Y.

498,127.—Screen for Making Photo-Mechanical Printing Plates.
MAX LEVY, Philadelphia, Pa.

498,173.—Album Stand.
G. J. KRAUSHAAR, Cleveland, O.

498,396.—Photo-Mechanical Printing.
WM. KURTZ, New York, N. Y.

498,963.—Camera Shutter.
WM. F. TORREY, Providence, R. I.

499,380.—Graphoscope.
HENRY FRANZ, Brooklyn, N. Y.

499,763.—Photographic Plate-Holder.
ROBT. B. TAFFER, Des Moines, Iowa.

499,936.—Photographic Album Leaf.
S. POSEN, Offenbach-on the-Main, Germany.

499,975.—Photograph Holder.
D. T. ELMER, Monroe, Mich.

500,023.—Photographic Camera.
B. G. P. MÖLLER, Kolding, Denmark.

500,327.—Album.
C. F. GEYER, New York, N. Y.

500,348.—Photographic Camera.
J. F. PARSONS, Bristol, England,

500,707.—Magazine Camera.
EDGAR E. ELLIS, Rochester, N. Y.

500,875.—Photographic Roll-Holder.
XAVIER G. E. DE FAUCOMPRÉ, Paris, France.

501,340.—Photographic Gallery.
EUGEN HACKH, Stuttgardt, Germany.

501,510.—Camera Tripod Head.
S. C. HOPKINS, Boston, Mass., and A. HIGGINS, Cambridge, Mass.

501,703.—Photographic Camera.
CHAS. B. WITHINGTON, Janesville, Wis.

501,800.—Flash-Light Apparatus.
A. F. MALLICK, Jamestown, N. D.

501,857.—Cabinet Album.
O. H. WILLIAMS, Hamilton, O.

501,866.—Photographic Shutter.
FRANK A. BROWNELL, Rochester, N. Y.

501,931.—Photographic Camera.
JULIUS D. GARFIELD, Springfield, Mass.

502,198.—Photographic Camera.
CARL G. OSTEMANN, Boston, Mass.

502,450.—Stereoscope.
ANTON WAGNER, Philadelphia, Pa.

502,799.—Photographic Plate-Holder.
C. B WITHINGTON, Janesville, Wis.

502,857.—Photographic Camera.
F. A. HETHERINGTON, Indianapolis, Ind.

503,144.—Photographic Washing Apparatus.
S. A. KEM and E. FREDERICK PUECELL, Indian Territory.

503,518.—Ground-Glass Attachment for Cameras.
MAX BAUER, Greenville, N. J.

TRADE MARKS.

21,430.—Photographic Paper.
E. LIESEGANG.

21,572.—Photographic Paper, Plates and Chemicals.
A. SCHWARZ.

21,596—Photographic Dry Plates.
L. H. BAEKELAND.

21,787.—Photographic Prints.
G. F. E. PEARSELL.

21,932.—Photographic Card Mounts.
A. M COLLINS MFG. CO.

22,009.—Photographic Paper.
A. J. COHN.

22,153.—Photographic Developers.
ACTIEN GESELLSCHAFT FÜR ANILIN FABRIKATION.

22,154.—Photographic Developers.
ACTIEN GESELLSCHAFT FÜR ANILIN FABRIKATION.

22,274.—Photographic Preparations.
J. Hauff.

22,666.—Albumenized Paper.
THE SCOVILL & ADAMS CO.

23,180.—Photographing. Artists' Paper, used for Diamond Aristotype Company.

23,065.—Photographic Printing Paper.
THE EASTMAN KODAK CO.

23,389.—Cameras.
G. J. SPAULDING.

DESIGNS.

22,649.—Camera Case.
H. CASTOR.

RATES OF DOMESTIC POSTAGE

TO ANY PART OF THE UNITED STATES, CANADA, OR MEXICO.

SEE NOTE II.

	cts.	oz.	See Spec'l Note.
Address Tags	1	1	*a*
Bill Heads	1	1	*a*
Blotters (printed)	1	1	*a*
Blue Prints	1	2	*d*
Books, printed	1	2	*d*
Cards, playing	1	1	*a*
" printed			
". business			
" Christmas, etc.‡	1	2	*a*
" Easter‡			
" New Year‡			
Chromos‡	1	2	*a*
Catalogues	1	2	*d*
Circulars	1	2	*d*
Coins	1	1	*a b*
Copy (MSS.)	2	1	*e*
" (with proof sheets)	1	2	*e*
Crayon	1	1	
Desk Blotters	1	1	*a*
Drawings / Designs } Pen or Pencil	1	1	* *e*
Easter Cards‡	1	2	*a*
Engravings	1	2	*a*
Handbills	1	2	*a*
Letters	2	1	*e*
Labels (printed)	1	2	*a*
Lithographs	1	2	*a*
Manifold Letters	2	1	*e*
Manuscript	2	1	*e*
Magazines	1	4	*d*
Merchandise	1	1	*a b*
Maps (printed)	1	2	*e*
Newspapers	1	4	*d*
New Year Cards‡	1	2	
Packages, sealed	2	1	*b*

	cts.	oz.	See Spec'l Note.
Packages, unsealed	1	1	† *b*
Pamphlets	1	2	*d*
Patterns (cut)	1	1	*a*
Periodicals	1	4	*d*
PHOTOGRAPHS	1	2	*d*
Pictures (scrap)	1	2	
Playing Cards	1	1	*a*
Postal Cards	1	ea.	*f*
Printed Matter (*not merchandise or samples*)	1	2	*d*
Printed Envelopes	1	1	*a*
Prospectuses	1	2	*d*
Proof Sheets	1	2	*d g*
Plans (in writing)	2	1	*e*
Registration	10	ea.	*i*
Samples	1	1	*b*
Sample copies of regular publications mailed by publisher (second-class)	1	lb.	
Sample copies of regular publications not mailed by publisher	1	4	*a*
Scrap Pictures	1	2	*a*
Seeds, Plants, etc.	1	2	
Specie	1	1	*a b*
Stereoscopic Views	1	2	*d*
Tickets	1	2	*a*
Type Writer Work	2	1	*e*
Valentines (if printed without embellishment with silk, satin, etc.)	1	2	*a*
Visiting Cards (printed)	1	2	*a*

* If pen or pencil drawings contain no written letters, figures, or words, they are fourth class matter, otherwise first class.

† May be either third or fourth class.

‡ Third-class matter if printed on paper; if on silk, cotton, satin, canvas, or other material than paper or paper board, fourth class matter.

GENERAL NOTES.

Cards, circulars, catalogues, etc., relating to the business of one or more firms, and different articles of all kinds and classes, may be placed in the same package, provided that the highest rate of postage that any part of the contents is subject to shall be prepaid on the whole package.

The following articles are unmailable, and will not be dispatched in any case:—Spirituous, malt, or vinous liquids, poisons, explosive matter, inflammable articles, live or dead animals, insects (except queen bees when safely secured), substances exhaling a bad odor, fresh fruits and vegetables, obscene or indecent books, prints, writings, or papers; all postal cards or letters on the envelopes of which lewd, obscene, or lascivious deliniations, offensive duns, epithets, terms, or language are written or printed, all matter concerning lotteries or schemes devised and intended to defraud the public, or for the purpose of obtaining money under false pretences, and all mail matter not addressed to a post-office or to no particular person, firm, company, or publication.

Special Delivery.—Any mail matter, when bearing, in addition to the regular postage, a "special delivery" stamp (face value, ten cents), will be immediately delivered by special messenger on its arrival at destination, between the hours of 7 A.M. and 7 P.M., and within one mile from the post-office, if it be not a letter-carrier office. At letter-carrier offices special delivery is obligatory within the carrier limits, and between the hours of 7 A.M. and 11 P.M.

Note A.

Fourth Class Matter—Samples and Merchandise.—Weight limited to 4 pounds. Postage must be fully prepaid. The rate is *one cent an ounce or fraction thereof.* Merchandise may have printing on it or on the wrapper. Written marks, in addition to the address, are allowed on Fourth Class matter, as follows:—The name and address of sender preceded by the word "From"; and any names, numbers, marks, or letters for the purpose of description. A request to the delivering Postmaster may also be written asking him to notify sender if the package is not delivered; also an ordinary request to return to the sender in case of non-delivery.

Note B.

Articles of the Fourth Class liable to injure or deface the mails, such as glass, needles, nails, pens, etc., must first be placed in a bag, box or open envelope, which must then be inclosed in another outside tube or box made of metal or hardwood, without sharp corners or edges and having a sliding clasp or screw lid, thus securing the articles in a double package; if the articles are fragile, they must be packed with sawdust, cotton or other packing material in the inside pocket. Powdered articles, such as flour, sugar, etc., may be inclosed in a transparent bag or envelope, and must be securely packed so as to prevent breaking. Admissible liquids and oils (not exceeding 4 ounces liquid measure), pastes, salves or articles easily liquefiable, must conform to the following conditions: When in glass bottles or vials, such bottles or vials must be strong enough to stand the shock of handling in the mails, and must be inclosed in a wooden or papier-mache block or tube not less than three-sixteenths of an inch thick in the thinnest part, strong enough to support the weight of mails piled in bags and resist rough handling; and there must be pro-

vided, between the bottle and its wooden case, a cushion of cork crumbs, cotton, felt, asbestos, or some other absorbent, sufficient to protect the glass from shock in handling; the block or tube impervious to liquids, including oils, etc., to be closed by a tightly fitting screw-lid of wood or metal, with a rubber or other pad so adjusted as to make the block or tube water-tight and to prevent the leakage of the contents in case of breaking of the glass. When inclosed in a tin cylinder, metal case or tube, such cylinder, case or tube should have a screw-lid with a rubber or cork cushion inside in order to make the same water-tight, and should be securely fastened in a wooden or papier-mache block (open only at one end), and not less in thickness and strength than above prescribed. Manufacturers or dealers intending to transmit articles or samples in considerable quantities, should submit a sample package, showing their mode of packing, to the Postmaster at the mailing office, who will see that the conditions of this section are carefully observed.

Note D.

THIRD CLASS MATTER—PREPAYMENT.—Postage must be fully prepaid, otherwise the matter will be "held for postage." The rate is *one cent for every two ounces or fraction thereof. The limit of weight is* 4 pounds, except on single books. WRITING.—No writing is permitted on Third Class matter, except as follows: The name and address of the sender on the outside or inside of package, preceded by the word "From," and any printing not in the nature of personal correspondence. The sender is further allowed to mark a word or passage in a book or paper to which he desires to call special attention. He may also write a simple inscription or dedication upon the cover or blank leaf of a book or pamphlet. The date, address and signature of a circular may be written. Any other writing on Third Class matter will subject the package to letter rates of postage, and may render the sender liable to a fine of ten dollars. *Photographs* and *blue prints* must bear no other writing than the name of the sender.

WRAPPING —Mail matter of the Third Class must be so wrapped or inclosed that it can be readily examined without destroying the wrapper; otherwise it will be subject to postage at the First Class rate (two cents per ounce), as will all articles inclosed in sealed envelopes with clipped ends, sides or corners, or in boxes with covers secured by nails, and all packages the wrappers of which are secured to the inclosure by postage stamps.

Note E.

FIRST CLASS.—This class includes letters, postal cards, sealed packages, all matter wholly or partly in writing (whether manuscript or produced by type-writer or copying press), drawings, designs, plans and maps, if they contain descriptive words, letters or figures in writing, produced by hand, manuscript for publication not accompanied by proof-sheets, and all personal correspondence, whether in writing or in print. (See under heads "Third Class," "Fourth Class," notes "A" and "D," certain writing permitted in or on articles of those classes.)

The rate of postage on mail matter of the First Class (sealed or unsealed) is *two cents for each ounce or fraction thereof*, excepting postal cards, and excepting also letters for *local delivery* posted at the post-offices where no letter-carriers are employed, in which case the rate is *one cent per ounce or fraction thereof.*

The law provides that the postage on all mail matter of the First Class shall be prepaid only by postage stamps or by inclosure in government

stamped envelopes, and that any article of this class (not entitled by law to free transmission in the mails) deposited in a post-office wholly unpaid or prepaid *less than one full rate, cannot be forwarded or delivered*, but must be "held for postage." LIMIT OF WEIGHT.—There is no limit to the weight of letters or packages of First Class matter. WRAPPING OR ENCLOSURE.—Mail matter of the First Class may be wrapped or enclosed in any manner that the sender may desire. RETURN.—Letters not delivered will be returned to writer free, if a request to that effect is placed on the envelope. FORWARDING.—A letter will be forwarded by the Postmaster who may hold it, to another post-office, at the request of the person to whom the letter is addressed. Letters addressed to the care of another person, or erroneously delivered, may be redirected and returned within a reasonable time to post-office, and will be forwarded without additional charge.

The putting on of requests to return the matter to the sender in case of non-delivery is recommended by the Post-Office Department—not on first-class alone, but on all matter.

Note F.

POSTAL CARDS.—No cards are "Postal Cards" except those issued by authority of the Postmaster-General (the imitation of which is forbidden and punished by law); and so-called "Postal Cards" issued by private parties are subject to letter rates of postage when they contain any written matter whatever in addition to the date, and the name of the addressee and of the sender, and the correction of mere typographical errors herein. Nothing whatever may be attached to a Postal Card except an address label, which may be pasted to the *address side*, and no printing or writing is permitted upon the address side of Postal Cards, except that imprinted thereon at the manufactory and such as may be necessary for the proper direction of the same. Postal Cards are unmailable as such when incomplete or mutilated, and in all cases where any of the above conditions are not complied with. Undelivered single Postal Cards are not returned to senders.

Note G.

PROOF SHEETS may be corrected or uncorrected, with or without the original manuscript, additions to or alterations in the matter, or directions as to the typographical part of the work; but directions in writing as to binding, quality of paper, etc., are not permissible unless the letter rate of postage be paid.

Note H.

CANADA AND MEXICO.—Matter mailed in the United States, addressed to Mexico, is subject to the same postage rates and conditions as it would be if it were addressed for delivery in the United States, except that articles of miscellaneous merchandise (fourth-class matter) not sent as *bona-fide* trade samples, are required to be sent by "Parcels Post," and that the following articles are *absolutely excluded* from the mails without regard to the amount of postage prepaid, or the manner in which they are wrapped, viz.:

All sealed packages, other than letters in their usual and ordinary form; *all* packages (including packages of second-class matter, which weigh more than 4 pounds 6 ounces), except such as are sent by "Parcels Post;" liquids, pastes, confections and fatty substances; publications which violate any copyright law in Mexico.

Single volumes of printed books in *unsealed* packages, are transmissible to Mexico in the regular mails without limit as to weight.

"*Commercial Papers*," and *bona-fide* trade samples are transmissible to Mexico in the regular mails at the postage rate given above, opposite "Commercial Papers" and "Samples of Merchandise," respectively. See also Note 15, pp. 815 and 816 of the GUIDE for January, 1890.

Matter mailed in the United States, addressed to Canada, is subject to the same postage rates and conditions as it would be if were addressed for delivery in the United States, except that "Commercial Papers" are transmissible at the postage rate given above opposite "Commercial Papers," and that the following articles are *absolutely excluded* from the mails, without regard to the amount of postage prepaid, or the manner in which they are wrapped, viz.:

All sealed packages, other than letters in their usual and ordinary form ; *all* packages (except single volumes of printed books and packages of second-class matter), which weigh more than 4 pounds 6 ounces ; Police Gazettes ; publications which violate any copyright law of Canada.

Note 1.

REGISTRATION.—All kinds of mail matter can be registered at the rate of eight cents for each package, in addition to the postage at regular rates, both postage and fee to be fully prepaid by stamps ; all conditions as to marks, contents and method of securing packages being the same as described under the various classes (Notes A, D, E.) Each package must bear name and address of sender, and a receipt will be returned from the person to whom addressed.

DOMESTIC MONEY ORDERS.

For sums not exceeding	$5	$ 05
" " " "	10	08
" " " "	15	10
" " " "	30	15
" " " "	40	20
" " " "	50	25
" " " "	60	30
" " " "	70	35
" " " "	80	40
" " " "	100	45

The fee for a Postal Note is 3 cents.

A Postal Note may be drawn for any amount from one cent to four dollars and ninty-nine cents.

INTERNATIONAL MONEY ORDERS.

The fees for International Money Orders are as follows:

For sums not exceeding			$10	$0 10	Over $50 and not exceeding		$60	$0 60
Over $10 and not exceeding			$20	20	" 60 " "		70	70
" 20 " "			30	30	" 70 " "		80	80
" 30 " "			40	40	" 80 " "		90	90
" 40 " "			50	50	" 90 " "		100	1 00

The sender of a money order must state the particulars thereof upon a form furnished by the post-office.

A money order may be endorsed once only.

The person who presents a money order for payment must be identified if unknown to the postmaster, unless the remitter upon his application waives identification.

A domestic money order may be repaid within a year at the office of issue. The fee will not be refunded.

Duplicates of lost or invalid money orders are issued by the department free of charge upon application made through the issuing or paying postmaster by remitter, payee or indorsee.

The issue of money orders on credit is prohibited.

A money order may be paid to a second person by endorsement of payee, or upon a written order or power of attorney to be filed with the paying postmaster.

A duplicate cannot be obtained of a postal note lost or destroyed.

An invalid postal note, that is, one not paid within three months from the last day of month of issue, will be replaced at an extra charge of three cents, by a duplicate issued by the department, to be applied for through the postmaster at any money order office. The invalid note must accompany the application.

International money orders may be drawn for payment in the following countries and places:

Order Should be Sent by Remitter to Payee.

Alexandria, Egypt, if drawn as a French order.
Algeria.
Bahama Islands.
Bermudas.
Beyroot, Turkey, if drawn as a French order.
British Bechuanaland, South Africa.
British Guiana.
Canada.
Cape Colony, South Africa.
Constantinople, Turkey, if drawn as British or French.
France.
Great Britain and Ireland.
Hawaiian Islands.
Jamaica.
Leeward Islands.
Newfoundland.
New South Wales.
New Zealand.
Orange Free State, South Africa.
Panama.
Queensland.
Salonica, Turkey, if drawn as a French order.
Smyrna, Turkey.
South Australia.
Tasmania
Transvaal, South Africa.
Tripoli, Africa.
Tobago, West Indies
Tunis, Africa.
Trinidad.
Victoria, Australia.
Windward Islands.
Zanzibar, Africa, if drawn as a French order.

Order May be Kept by Remitter as a Receipt.

Accra, Gold Coast, Africa.
Aden, Arabia.
Adrianople, Turkey.
Alexandria, Egypt, if drawn as a British order.
Amoy, China.
Assab, Africa.
Austria-Hungary.
Azores.
Bagdad, Turkey.
Bassorah. or Basra, Turkey.
Bathurst, Gambia, Africa.
Belgium.
Belize, British Honduras.
Beluchistan, Asia.
Bermuda.
Beyroot, Turkey, if drawn as British or Austrian.
British Honduras.
Bulgaria.
Bunder Abbas or Gomhroon, Persia.
Burmah, Asia.
Bushire, or Ahu'-Shehr, Persia.
Caipha (or Haifa), Turkey.
Cameroons, Cameroons, Africa.
Candia, Crete, Turkey.
Canea, Crete, Turkey.
Canton, China.
Cape Coast Castle, Gold Coast, Africa.
Ceylon.
China.
Constantinople, Turkey, if drawn as Austrian.
Cyprus.
Danish West Indies.
Dar es Salaam, Africa.
Denmark.
Durazzo, Turkey.
Egypt.
Falkland Islands.
Faroe Islands.
Foochow, China.
Gambia, Africa.
Germany.
Gibraltar.
Gold Coast Colony, Africa.
Guadur or Gwadel, Beluchistan.
Hankow, China
Heligoland.
Herzegovina.
Hoihow, China.
Hong Kong, China.
Iceland.
India, British.
Italy.
Jaffa, Turkey.
Japan.
Jask, Persia.
Jerusalem, Turkey.
Kerassunde, Turkey.
Kilwa, Africa.
Klein-Popo, or Little Popo, Togo, Africa.
Lagos, Africa
Labuan, Borneo.
Lamu, Africa.
Linga, or Lingor, Persia.
Little Popo, or Klein-Popo, Togo, Africa.
Lome, Togo, Africa.
Luxemburg, Grand Duchy.
Madeira Islands.
Malacca, Straits Settlements.
Malta.
Massowah, Africa.
Mauritius.
Mitylene, Turkey.
Mombasa, Africa.
Muscat, Arabia.
Natal, South Africa.
Netherlands.
Ningpo, China.
North Borneo, Sandakan.
Norway.
Panzani, Africa.
Penang, Straits Settlements.
Portugal.
Previsa, Turkey.
Retimo, Crete.
Rhodes, Turkey.
Roumania.
Saadani, East Africa.
Saint Helena.
Salonica Turkey, if drawn as British or Austrian.
Salt Pond, Gold Coast.
Samsun, Turkey.
Sandakan, Borneo.
San Quaranta, Turkey.
Sarawak, Borneo.
Scio, Chios, Turkey.
Seychelle Islands.
Shanghai, China.
Sierra Leone, Africa.
Singapore, Straits Settlements.
Smyrna, Turkey, if drawn as Austrian.
Straits Settlements.
Swatow, China.
Sweden.
Switzerland.
Tanga, Africa.
Tangier, Morocco.
Trebizond, Turkey.
Turk's Island, West Indies.
Valona, Turkey.
Victoria, Cameroons, Africa.
Western Australia.
Zanzibar, Africa, if drawn as a British order.

RATES OF POSTAGE TO FOREIGN COUNTRIES.

UNIVERSAL POSTAL UNION.

Treaty concluded at Vienna, Austria, July 4, 1891.

	Cts.
Letters, per 15 grams or ½ ounce (prepayment optional, except to places marked *).	5
Postal Cards, each	2
Newspapers and other printed matter, per 2 ounces	1
Commercial papers, First 10 ounces or fraction thereof	5
Commercial papers, Every additional 2 ounces	1
Samples of merchandise, First 4 ounces	2
Samples of merchandise, Every additional 2 ounces	1
Registration Fee on letters or other articles	8

All correspondence other than letters must be prepaid at least partially.

†Correspondence paid to British Indian Frontier only.

INTERNATIONAL MONEY ORDERS are issued only to Countries or Places marked ¶.

COUNTRIES OR PLACES WHICH, WITH THE UNITED STATES, ARE COMPRISED IN THE UNIVERSAL POSTAL UNION, AND TO WHICH THE ABOVE RATES APPLY.

(*The Italics in brackets represent the Nationality of Foreign Possessions.*)

Abyssinia, East Africa.
Aden, Arabia, British P. O.
Africa (W. C.) Br. Colonies.
Africa (Fr. Port. & Sp. pos.)
Ajuda, Africa. (*Portuguese*)
Algeria, Africa. (*French.*)
Algiers, Africa. (*French.*) ¶
Alhucemas, N. Africa. (*Sp.*)
Amar, Asia. (*Spanish.*)
Amirante Islands, E. Africa.
Amoy, Hong Kong P. O.
Andorra, Rep. of (*Spain.*)
Angola, Africa. (*Portug'se.*)
Annobon Isl'd., Africa. (*Sp.*)
Antigua, Isl'd. W.I. (*British*)
Aracan, British India.
Argentine Republic.
Aruba, S. America. (*Dutch.*)
Asia (Dch., Fr., Pr. & Sp. Col.)
Colon, U. S. of Colombia.
Assinie, Africa. (*French.*)
Austria-Hungary.¶
Azores Islands. (*Port.*)¶
Bahama Islands. (*British.*)
Bakel, Africa. (*French.*)
Balearic Isles. (*Spanish.*)
Bali, Asia. (*Dutch.*)
Banca, Asia. (*Dutch.*)
Barbadoes, W. I. (*British.*)¶
Barbary (Tunis & Tripoli.)
Batavia, Java, Asia. (*Dutch.*)
Bay Islands, Sp. Honduras.
Belgium.¶
Bermuda Islds., W. I. (*Br.*)
Bien-Hoa, Coch.-China. (*Fr*)
Billiton, Asia. (*Dutch.*)
Bissao, Africa. (*Portug'se.*)
Bogota, U.S. of Colombia.
Bolivia, South America.
Bonaire Islds., W.I. (*Dutch.*)
Borneo, Asia. (*Dutch.*)
Bourbon, Isld., Africa. (*Fr.*)
Brazil, South America.
Bulgaria, Principality of.
Burmah, British India.
Cabul, Afghan, *via* Italy.*†
Cacheo, Isld., Africa. (*Port*)
Cambodia, Fr. P. Offices in.
Cameroons (or Kameroun), West Africa.
Canary Islands. (*Spanish.*)
Canton, Hong Kong, P. O.
Cape Verde Is., Afr. (*Port.*)
Caroline Is., Oceanica. (*Sp.*)
Carthagena, U. S. Colombia.
Casablanca, Morocco. (*Sp.*)
Celebes, Asia. (*Dutch.*)
Ceuta, N. Africa. (*Spanish.*)
Ceylon. (*British.*)
Chaffarine Is., N. Afr. (*Sp.*)
Chandernagore, India. (*Fr.*)
Chili, South America.
China, *via* Russia.
China, *via* Hong Kong.
China, *via* France.
Cochin China (French Col.in)
Colombia (U.S. of) S. Amer.
Comino, Malta. (*British.*)
Cominotto, Malta. (*British.*)
Congo (State of) W. Africa.
Constantinople, Turkey.¶
Corisco Is., Africa. (*Sp.*)
Costa Rica, Cent'l America.
Cuba, W. I. (*Spanish.*)
Curacoa Is., W.I. (*Dutch.*)
Cyprus Island, (*British.*)
Dagana, Senegal. (*French.*)
Damao, Asia. (*Portuguese.*)
Denmark.¶
Desirade Isld., W. I. (*Fr.*)
Diu, Asia. (*Portuguese.*)
Dominica Isld., W. I. (*Brit.*)
Dominica, Rep. of, W. I.
East Africa, Ger. Protectorate.
Ecuador, S. America.
Egypt, Africa.¶
Falkland Is., S. Amer. (*Br.*)
Faroe Islands, Denmark.
Fernando Po. Is., Afr., (*Sp.*)
Finland, Gr. Duchy, Russia.
Flores, Asia. (*Dutch.*)
Foo-chow, Hong Kong P. O.
Formosa, *via* Hong Kong.
France.¶
French Colonies, all.
Fusam-po, Corea, Jap. P.O.
Gaboon, Senegal. (*French.*)
Gambia, W. Africa. (*Br.*)
Gambier, Is., Oceanica. (*Fr.*)
Genzanshin, Corea.) Japanese P. O. at.
Germany.¶
Gibraltar, Spain. (*British.*)
Goa, Asia. (*Portuguese.*)
Gold Coast, W. Africa. (*Br.*)
Goree, Senegal. (*French.*)
Gozzo, Malta. (*British.*)
Grand Bassam, W. Afr. (*Fr.*)
Great Britain.¶
Greece.
Greenland, N. America.
Grenada, Isld., W. I. (*Br.*)¶
Grenadines Is., W. I. (*Br.*)
Guadeloupe Is., W. I. (*Fr.*)
Guadur, British India.
Guatemala, Centr. America.
Guiana, Br., Fr. and Dutch.
Hankow, Hong Kong P. O.
Hawaii, Sandwich Islands.¶
Hayti, Isld., W. I.
Hatien, Cochin China. (*Fr.*)
Heligoland Isld., Germany.
Hindostan, British India.
Hoihow, Hong Kong P. O.
Holkar, Br. Ind. *via* Italy.†
Honduras, Br. C. America.
Honduras, Rep. C. America.
Hong Kong, China.¶
Hungary.
Hyderabad, Ind., *via* Italy.*†
Iceland Isld., Denmark.
India, British.¶
India (French Est'blish'ts in)

RATES OF POSTAGE TO FOREIGN COUNTRIES—*Continued.*

Ionian Isles, Greece.
Ireland.¶
Isle of Pines, Oceanica. (*Fr.*)
Italy.¶
Jamaica, Isld., W. I. (*Br.*)¶
Japan, Asia.¶
Java, Batavia, Asia (*Dutch*).
Jinsen (Corea), Jap. P. O. at
Kalgan, China, *via* Russia.
Kameroun.
Karakal, India. (*Fr.*)
Kashmir, Ind., *via* Italy.*†
Kiung-Chow, H'g K'g P. O.
Labrador.
Labuan, Philippine Isl. (*Br.*)
Ladakh, Thibet, *via* Italy.*
Ladrone Is., Oceanica (*Sp.*)
Lagos, W. Africa (*Br.*)
Larrache, Morocco. (*Span.*)
Les Saintes, Is., W. I. (*Fr.*)
Leeward Is., W. I. (*Br.*)
Liberia, Africa.
Lichtenstein, Princ. Austria.
Lombok, Asia. (*Dutch.*)
Low Islds., Oceanica. (*Fr.*)
Loyalty Is., Oceanica (*Fr.*)
Luxemburg (Gr. Duchy of).¶
Luzon, Philippine Is. (*Sp.*)
Macao Hong Kong P. O.
Macassar, Asia. (*Dutch.*)
Madagascar Isls., Afr. (Ste. Marie, Tamatave, Majunga and Ambositra, Andevorante, Fenerive, Fiaranantsoa, Foulpointe, Ivondro, Maevatanana, Mahambo, Mahanoro, Mahela, Maintirano, Mananjary, Morondava, Morotsangana, Nossi-Vé, Tananarive [also known as [Antananarivo, Vatomandry, Vohemar.
Madeira, Isld., Portugal.¶
Madura, Asia. (*Dutch.*)
Mahe, India. (*French.*)
Malacca Straits Sett's. (*Br.*)
Malta, Isld. (*British.*)
Mandalay, Br. Indian P. O.
Manila, Philippine Isls. (*Sp.*)
Mariana Is., Oceanica. (*Sp.*)
Marie Galante, Is., W. I. (*Fr.*)
Marquesas Is., Oce'ca. (*Fr.*)
Marshall Islands, Ger. Pro.
Martinique Is., W. I. (*Fr.*)
Massowah, R. Sea (It. P. O. at)
Mauritius Is., Africa. (*Br.*)
Mayotte, W. Africa. (*Fr.*)
Mazagan, Morocco. (*Span.*)
Melilla, N. Africa. (*Span.*)
Mindanao, Philip'ne Is. (*Sp.*)
Miquelon, Is., N. Am. (*Fr.*)
Mogador, Morocco (*Sp.*)
Moldavia, Roumania.
Moluccas, Asia. (*Dutch.*)
Monaco, Princip. of France.
Montenegro.
Montserrat, W. I. (*British.*)
Morocco, Fr. & Sp. P. O. in.
Mozambique, Africa. (*Port.*)
Muscat, British Indian P. O.
Mysore, Br. Ind., *via* Italy.†
Mytho, Cochin China. (*Fr.*)
Nassau, N. P. Bahamas. (*Br.*)
Natal, Africa, Brit. Col. of.
Navigators Islands. (Ger. P. O. at Apia.)
Netherlands.¶
Netherland Colonies in Asia, America and Oceanica.
Nevis, Isld., W. I. (*British.*)
New Caledonia, Ocean. (*Fr.*)
Newfoundland.
New Guinea, Oce'ca. (*Dutch.*)
New Guinea Company, Territory of, Ger. Pro.
New South Wales, including Lord Howe Island and Norfolk Island.
New Zealand, including Chatham Islands.
Nicaragua, Centr. America.
Ning-po, Hong Kong, P. O.
Norway.¶
Nossi be, W. Africa. (*Fr.*)
Nubia, Egypt.
Obock, East Coast of Africa (French P. O. at.)
Ourga, China. *via* Russia.
Palawan, Philip'ne Is. (*Sp.*)
Panama, U. S. of Colombia.
Panay, Philip'ne Isl. (*Sp.*)
Papua, Oceanica. (*Dutch.*)
Paraguay, S. America.
Patagonia, S. America.
Pegu, British India.
Pekin, China, *via* Russia.
Penang, Straits Settlts. (*Br.*)
Penon de Gomera, N. Af. (*Sp.*)
Persia, Asia.
Persian Gulf, Br. Ind. P. O.
Peru.
Philippine Is., Ocea. (*Sp.*)
Pines, Isle of, Oceanica.
Pondicherry, India. (*Fr.*)
Porto Rico, W. I. (*Span.*)
Portugal.¶
Port. Col'o's, Asia & Africa.
Poulo-Condor, C. China. (*Fr.*)
Prince, Isld., Africa. (*Port.*)
Queensland.
Rabat, Morocco, Spa. P. O.
Reunion Isld., Africa. (*Fr.*)
Rhio-Riouw, Asia. (*Dutch.*)
Rodrigues Is., Africa. (*Br.*)
Roumania.
Russia.
Saba Islds., W. I. (*Dutch.*)
Saffi, Morocco, Span. P. O.
Saigon, Cochin China. (*Fr.*)
Salvador, Central America.
Samoan Islands (Ger. P. O. at Apia.)
Sandwich Islds., Oceanica.
San Domingo Republic, W. I.
San Marino Republic, Italy.
Senegal, W. Africa. (*Fr.*)
Senegambia, W. Africa. (*Br.*)
Servia.
Seychelles, Is., Africa. (*Br.*)
Shanghai (U. S. Postal Agency at.)
Shanghai, *via* Hong Kong.
Shanghai, *via* France.
Siam, Asia.
Sierra Leone, W. Af. (*Br.*)
Singapore, Asia. (*British.*)
Soudan, Egypt.
South Australia.
S. W. Africa, Ger. Pro.
Spain.
Spanish Colonies in Asia, Africa, America & Oce'ca.
St. Bartholomew, Is'ld, W. I. (*French.*)
St. Christopher I., W. I. (*Br.*)
St. Croix Isl., W. I. (*Dan.*)
St. Domingo, Republic, W. I.
St. Eustatius Is., W. I. (*Dut.*)
St. John Is., W. I. (*Dan.*)
St. Kitts Is., W. I. (*Br.*)
St. Lucia Is., W. I. (*Br.*)¶
St. Louis, W. Africa. (*Fr.*)
Ste. Marie Madagasc'r. (*Fr.*)
St. Martin, W. I. (*Fr. & Dut.*)
St. Pierre, W. I. (*French.*)
St. Thomas Is. W. I. (*Dan.*)
St. Thome Is.. Afr. (*Port.*)
St. Vincent, W. I. (*Br.*)¶
Staten Island, S. America.
Straits Settlem'ts, Asia. (*Br.*)
Sumatra, Asia. (*Dutch.*)
Sumbawa, Asia. (*Dutch.*)
Surinam, S. America. (*Dut.*)
Swatow. Hong Kong P. O.
Sweden.¶
Switzerland.¶
Tahiti Isld., Oceanica. (*Fr.*)
Tamatave, Madagasc'r. (*Fr.*)
Tangier, F. & Span. P. O.
Tasmania.
Tenasserim, British India.
Terra del Fuego.
Tetuan, Morocco, Sp. P. O.
Tien-Tsin, China, *via* Russia.
Timor, Asia. (*Dut. & Port.*)
Tobago Isld., W. I. (*Br.*)¶
Togo, W. Africa, Ger. Pro.
Tonquin (French P. O. in.)
Toubouai, Oceanica. (*Fr.*)
Trinidad Isld., W. I. (*Br.*)
Tripoli (Italian P. O. at.)
Tschandok, Co. China. (*Fr.*)
Tuamotou, Oceanica. (*Fr.*)
Tunis, (Fr. and Italian P. O.)
Turkey—Europe and Asia.
Turk's Island, W. I. (*Br.*)
Uruguay, S. America.
Venezuela, S. America.
Victoria.
Vingh-Long, C. China. (*Fr.*)
Virgin Isles, W. I. (*British.*)
Wallachia, Roumania.
West Indies.
Western Australia.
Yanaon, India. (*French.*)
Zanzibar, Afr., *via* Aden.*

*Regarding exceptions, see Note H., p. 406.

COUNTRIES IN UNIVERSAL POSTAL UNION WITH WHICH THE UNITED STATES HAS SPECIAL CONVENTIONS.

Canada, comprising Provinces of *British Columbia, Manitoba, New Brunswick, Nova Scotia, Ontario, Prince Edward Island, Quebec,* and *North West Territories*.....
Mexico.....

Limit of letter-weight 30 gr. or 1 oz.; *postage-rates* on all classes of mail matter; the United States domestic rates; except seeds, plants, etc., for Canada, the rate upon which is 1 cent per oz.

COUNTRIES OR PLACES NOT IN UNIVERSAL POSTAL UNION.

Prepayment is compulsory.
† The limit of payment is at port of debarkation ; for all other places, to destination.
‡ Samples are not accepted for these destinations.
§ Registration is allowed on letters and other articles. Fee, 10 cents.
‖ Registration is allowed *only* on letters. Fee, 10 cents.
¶ Money orders are issued at same rates as specified at top of page 381.
Postal cards cannot be sent from the United States to any of the following places *except* Canada.

COUNTRIES OR PLACES OF DESTINATION.	Per 15 Grams, or ½ Ounce.	News-papers.		Other Printed Matter, Samples and "Commercial Papers."	
		Limit for Single Rate.	Postage for Single Rate.	Limit of Weig	Postage for Single Rate.
	Cts.	Oz.	Cts.	Oz.	Cts
Africa, except Egypt, Liberia, Congo, the Transvaal, British, French, Spanish and Portuguese Colonies, the Territories of South-West Africa, and of Togo, Western Africa (German Protectorates), Tunis, and the European post-offices in Morocco, Abyssinia, and Madagascar, by British Mail.....†	10	2	2	2	
Ascension Island. S. Atlantic, British Mail...	10	2	2	2	
Basutoland, *see* Cape Colony.					
Bechuanaland, S. Africa, British Mail.....§	10	no	2	2	2
Caffraria, *see* Cape Colony.					
Cape Colony, S. Africa, British Mail.....§¶	10	2	4	2	2
China, British Mail, *via* Brindisi.....§	10	2	2	2	2
Comoro Islands (except Mayotte) Mozambique Channel.....	5	no	2	2	1
Fiji Islands, *via* San Francisco and Sydney.....†‡	5	no	2	2	2
Griqualand, *see* Cape Colony.					
Kimberly, *see* Cape Colony.					
Madagascar, except St. Marie, Tamatave, Majunga and Ambositra, Andevorante, Fenerive, Fiaranantsoa, Foulpointe, Ivondro, Maevatanana, Mahambo, Mahanoro, Mahela, Maintirano, Mananjary, Morondara, Nossi-Vé, Tananarive, Vatomandry, Vohemar, by British Mail.....†	10	2	2	2	2
Morocco, except Spanish Possessions on West Coast.....†	10	2	2	2	2
Navassa, West Indies, direct mail.....‡	5	no	2	2	2
Navigator's Islands, Pacific .....†‡	5	no	2	2	2
Orange Free State, *see* Cape Colony.					
Pitcairn Island, Pacific (*no registration.*) .....†‡	5	no	2	2	2
St. Helena, South Atlantic, British Mail.....§	10	2	2	2	2
Samoan Islands, *see* Navigator's Islands.					
Shanghai, direct, *via* San Francisco.....‡‖	5	no	2	2	2
Transvaal, South Africa. British Mail.....§	10	no	2	2	2

PARCELS POST.

STATEMENT SHOWING THE COUNTRIES TO WHICH PARCELS MAY BE SENT; THE DIMENSIONS, WEIGHT AND RATES OF POSTAGE APPLICABLE TO PARCELS, AND THE EXCHANGE POST OFFICES WHICH DISPATCH AND RECEIVE PARCELS POST MAILS.

Names of Countries.	Allowable Weight of Parcels.				Postage.		Exchange Post Offices.	
	Greatest Length.	Greatest Length and Girth Combined.	Greatest Girth.	Greatest Weight—Pounds.	For a Parcel not exceeding 1 Pound.	For every additional Pound or fraction of a Pound.	United States.	Foreign.
Bahamas	3 feet 6 inches.	6 feet.	.....	11	12 cts.	12 cts.	New York.	Nassau.
Barbadoes	3 " 6 "	6 "	.....	11	12 "	12 "	"	Bridgetown.
Colombia	2 "	.....	4 feet.	11	12 "	12 "	All offices authorized to exchange mails between the two countries.	
Costa Rica	2 "	.....	4 "	11	12 "	12 "		
The Danish West Indies	3 " 6 "	6 feet.	.....	11	12 "	12 "		
The Hawaiian Kingdom	3 " 6 "	6 "	.....	11	12 "	12 "	San Francisco.	Honolulu.
Honduras (British)	3 " 6 "	6 "	.....	11	12 "	12 "	New Orleans.	Belize.
Jamaica	3 " 6 "	6 "	.....	11	12 "	12 "	New York.	Kingston.
Leeward Islands	3 " 6 "	6 "	.....	11	12 "	12 "	"	St. John, Antigua.
Mexico	2 "	.....	4 feet.	11	12 "	12 "	All offices authorized to exchange mails between the two countries.	
Salvador	3 " 6 "	6 feet.	.....	11	12 "	12 "		
Guiana (British)	3 " 6 "	6 "	.....	11	12 "	12 "		
Windward Islands	3 " 6 "	6 "	.....	11	12 "	12 "		

AMERICAN PHOTOGRAPHIC SOCIETIES.

ALBANY CAMERA CLUB, THE.—Albany, N. Y. Organized October 21, 1887. *President*, W. W. Byington; *Vice-President*, R. L. Banks, Jr.; *Board of Directors*, T. C. Lentze, Prof. Maurice Perkins, Chas. S. Pease, M. H. Rochester, C. B. Tillinghast, J. S. Van Buren, Dr. S. B. Ward, Dr. T. F. C. Van Allen, and the officers *ex-officio; Treasurer*, Karl J. Phisterer; *Librarian*, Charles L. Palmer; *Secretary*, John S. Paterson, 29 Steuben Street, Albany, N. Y. Place of meeting, 29 Steuben Street. Ordinary meetings, first Friday in every month. Special meetings, at call of President. Annual meeting, first Friday in April. Membership, May 5th: Honorary, 2; active, 47; associate and non-resident, 110; total, 159. Exhibitions, one print exhibition and one or more lantern exhibitions.

AMATEUR PHOTOGRAPHIC ASSOCIATION.—Selma, Dallas County, Ala. Organized December 29, 1887. *President*, William S. Monk; *Executive Committee*, Fritz E. Keipp, S. A. Sexton; *Treasurer-Secretary*, S. Orlando Trippe, Selma, Dallas County, Ala. Place of meeting, Harrison's studio: Ordinary meetings, second Tuesday in each month. Special meetings, at call of President. Annual meeting, second Tuesday in January. Membership September 1st: Active, 15; total, 15.

AMERICAN LEAGUE OF AMATEUR PHOTOGRAPHERS, THE.—Organized, New York, July 12, 1892. *President*, Paul L. V. Thiery; *Vice-Presidents*, Dr. George L. Parmele, of Hartford; Miss Frances B. Johnston, of Washington, D. C.; *Executive Committee*, Paul L. V. Thiery, Dr. Geo. L. Parmele, Miss F. B. Johnston, W. S. Drew, R. M. Fuller, T. J. Burton, Dr. James H. Stebbins, Jr., H. S. Fowler, O. S. Teale, C. G. Hine; *Treasurer*, W. H. Drew, Lynn, Mass.; *National Delegate*, R. M. Fuller, Cranford, N. J.; *Secretary*, T. J. Burton, 113 West 38th Street. Place of meeting, 113 West 38th Street, New York. Annual meeting, second Tuesday in May. Membership September 1st: active, 1253; total, 1253. Publication, *The Developer*, monthly.

Officers of the New York Division: *President*, James H. Stebbins, Jr., Society of Amateur Photographers, New York; *First Vice-President*, Dr. Ely Van De Warker, Syracuse Camera Club; *Second Vice-President*, Frank La Manna, Brooklyn Academy of Photography; *Secretary-Treasurer*, H. S. Fowler, Brooklyn Academy of Photography.

Officers of the New Jersey Division: *President*, Oscar S. Teale, President of the Plainfield Camera Club; *First Vice-President*, Wm. A. Halsey, of Newark Camera Club; *Second Vice-President*, A. J. Thomas, President Hoboken Camera Club; *Secretary-Treasurer*, T. W. Harvey, M.D., President of the Orange Camera Club.

ASSOCIATION OF GERMAN PHOTOGRAPERS.—New York. Organized March 4, 1868. *President*, Anton Mildenberger; *Vice-President*, Karl Kutscher; *Executive Committee*, A. Esselborn, H. Borgfeld, L. Schill; *Treasurer*, G. L. Pellnitz; *Librarian*, Otto Buehler; *Secretary*, L. Schmid, 62 East 4th Street. Place of meeting, Metropolitan Assembly Rooms, 62 East 4th Street. Ordinary meetings, second and fourth Wednesdays of every month, at 8 P.M. Annual meeting, second Wednesday in March. Membership: Honorary, 6; active, 42; corresponding, 1; total, 49.

BALTIMORE CITY PHOTOGRAPHIC CLUB.—Madison and Eutaw Streets. Organized May 19, 1891. *President*, A. S. Murray; *Vice-President*, Henry Stockbridge, Jr.; *Directors*, A. S. Murray, Henry Stockbridge, Jr., Dr. Frank Slothower, J. P. Bigham, F. W. McAllister, H. D. Williar, E. M. Barker, Chas. Quartrley, Davies Murdoch, A. J. Godby, Wm. H. Corner; *Treasurer*, J. P. Bigham; *House Committee*, Chas. Quartley, F. W. McAllister, A. J. Godby; *Secretary*, Dr. Frank Slothower, 819 North Howard Street, Baltimore, Md. Place of meeting, corner of Eutaw and Madison Streets. Ordinary meetings, first Tuesday in each month, 8 P.M. Special meetings at call of President. Annual meeting, first Tuesday in October. Membership September 1st. Honorary, 71; active, 70; corresponding, 5; total, 146. Exhibitions, annual exhibition of members' slides, exhibitions of slides of interchange bi-monthly.

BRIDGETON CAMERA SOCIETY.—Bridgeton, N. J. Organized January 25, 1890; incorporated under the laws of New Jersey, March 25, 1893. *President*, Henry A. Janvier; *Vice-President*, George Hampton; *Executive Committee*, Hugh L. Reeves, Howard W. Fithian, Emerson Garrisou; *Treasurer*, Sydney E. Bowen; *Recording Secretary*, Oscar F. Anderson; *Corresponding Secretary*, Frank M. McGear, Jr., Commerce and Laurel Streets, Bridgeton, N. J. Place of meeting, rooms, 48 E. Commerce Street. Ordinary meetings, first Tuesday evening each month, 8 o'clock. Special meetings at call of President. Annual meeting, first Tuesday February. Membership September 1st: Active, 29; total, 29. Publications, *Photographic Times*, *Wilson's American Amateur Photographer*, *Providence Photographer*, *Outing* and daily papers. Exhibitions February 3d each year and October (the October projected only), spring, summer and autnmn outings for medals and honor pictures. Dark-rooms free to visitors upon application to Executive Committee. Visitors always welcome.

BROOKLYN ACADEMY OF PHOTOGRAPHY.—177 and 179 Montague Street, Brooklyn, N.Y. Organized February, 1887. *President*, John Merritt, M.D. *First Vice-President*, F. Dana Reed; *Second Vice-President*, Starks W. Lewis; *Trustees*, John Merritt, M.D., F. Dana Reed, Starks W. Lewis, Harry S. Fowler, C. M. Trowbridge, Wm. T. Wintringham, A. S. Barney, Frank La Manna, G. Poey, Wm. Arnold, C. S, Reynolds, A. R. Pardington; *Treasurer*, Wm. T. Wintringham; *Librarian*, A. S. Barney; *Corresponding Secretary*, Harry S. Fowler, 578 Halsey Street, Brooklyn; *Recording Secretary*, C. M. Trowbridge, 177 and 179 Montague Street, Brooklyn. Place of meeting, 177 and 179 Montague Street. Ordinary meetings, second Wednesday evening in each month at 8 o'clock. Special meetings called when necessary. Annual meeting, second Wednesday evening in February. Membership September 1st: Honorary, 5; active, 90; associate, 18; corresponding, 15; total, 128. Exhibitions, public lantern exhibitions monthly from November to May; print exhibition annually.

BROOKLYN INSTITUTE, DEPARTMENT OF PHOTOGRAPHY OF THE.—Organized March, 1889. *President*, J. Foster Flagg; *Vice-President*, Geo. W. Wundram; *Treasurer*, P. L. Le Brunn; *Curator*, L. E. Meeker, M. D.; *Corresponding Secretary*, Miss Anna L. Meeker; *Secretary*, Gould W. Hart, 849 Monroe Street, Brooklyn. Place of meeting, 201 Montague Street. Ordinary meetings, every Thursday evening. Special meetings, fourth Monday evening each month. Annual meeting, May. Membership September 1st: Active, 220; total, 220. Exhibitions, in May of every year.

BROOKLYN SOCIETY OF AMATEUR PHOTOGRAPHERS.—Organized March 22, 1889. *President*, Homer Ladd; *Vico-President*, C. M. Trowbridge; *Treasurer*, Allan Ormsbee; *Secretary*, H. P. Sewall, 101 Hicks Street, Brooklyn. Place of meeting, at members' residence. Ordinary meetings, first Thursday in each month, at 8 o'clock P.M. Annual meeting, first Thursday after first Wednesday in January. Membership: Honorary, 1; active, 15; total, 16.

BOSTON CAMERA CLUB.—50 Bromfield Street, Boston, Mass. Organized October 7, 1881, as The Boston Society of Amateur Photographers; reorganized July 16, 1886, as The Boston Camera Club; incorporated April 6, 1887. *President*, Edward R. Andrews; *Vice-Presidents*, George M. Morgan, William Sumner Briggs, William O. Witherell; *Secretary*, Wilbur C. Brown, 50 Bromfield Street, Boston Mass.; *Treasurer*, F. Alcott Pratt; *Librarian*, J. Prince Loud; *Executive Committee*, Edward R. Andrews, George M. Morgan, William Sumner Briggs, William O. Witherell, Wilbur C. Brown, F. Alcott Pratt, J. Prince Loud, Rufus A. Bullock, William Garrison Reed, Charles H. Currier, Joseph T. Greene, David W. Lewis, John C. Holman; *Committee on Rooms*, W. O. Witherell, C. H. Currier, R. A. Bullock; *Committee on Entertainment*, G. M. Morgan, J. P. Loud, J. C. Holman; *Committee on New Members*, W. S. Briggs, J. T. Greene, D. W. Lewis. Place of meeting, Clnb Rooms, 50 Bromfield Street. Ordinary meetings, first Monday evening of each month, except July, August and September, at 8 o'clock. Special meetings, at the call of the President or of five members. Annual meetings, first Monday evening in January. Membership, May 1, 1893: Honorary, 5; active, 98; associate, 8; total, 111. Exhibitions, informal each month. A joint exhibition with the Photographic Society of Philadelphia and the Society of Amateur Photographers of New York, in Philadelphia, April 17 to 29, 1893; in New York in 1894; in Boston in 1895: in Philadelphia in 1896, etc.

BUFFALO CAMERA CLUB.—Organized October 10, 1888. *President*, Willis O. Chapin; *Vice-President*, G. Hunter Bartlett; *Directors*, Willis O. Chapin, G. Hunter Bartlett, Dr. M. D. Mann, A. G. Hauenstein, Charles R. Wilson, Charles E. Hayes, H. H. Boyce, George J. Bailey and Dr. H. M. Hill; *Treasurer*, Charles E. Hayes; *Librarian*, Charles R. Wilson; *Secretary*, Charles R. Wilson, 298 Main Street, White Building, Buffalo, N. Y. Place of meeting, Club's Rooms, 619 Main Street, Arcade Building. Ordinary meetings, second Tuesday each month, 8 P.M. Special meetings, subject to call. Annual meeting, second Tuesday in October. Membership April 1: Active, 50; corresponding, 10; total, 60. Annual exhibition of photographic work and material. Course of lectures on Photography.

CAMERA CLUB OF HARTFORD, THE.—No. 25 Pratt Street, Hartford, Conn. Organized February 18, 1885; incorporated 1892. *President*, Herbert O. Warner; *Corresponding Secretary*, Chas. R. Nason, Box 865, Hartford, Conn.; *Executive Committee*, H. O. Warner, Chas. R. Nason, A. H. Pitkin, F. D. Berry, G. L. Parmele, R. A. Wadsworth, W. W. Walker; *Treasurer*, F. D. Berry; *Secretary*, R. A. Wadsworth, Box 480, Hartford, Conn. Place of meeting, Club Rooms, No. 25 Pratt Street. Ordinary meetings, second Tuesday of each month, excepting July and August. Special meetings, at call of President, or at the written request of five members. Annual meeting, second Tuesday in October. Membership September 1: Honorary, 7; active, 68; total, 75. Exhibitions, annual print exhibition in February.

CAMERA DEPT. NAT. HIST. SOCIETY, MILLBURY, MASS.—Organized June, 1888. *President*, Geo. C. Webber, M.D.; *Vice-President*, T. D. Bristol, M.D.; *Executive Committee*, Geo. C. Webber, M.D,, F. B. Luce, T. E. Bottomley; *Treasurer*, same as Nat. Hist. Soc.; *Secretary*, T. E. Bottomley, Box 467, Millbury, Mass. Place of meeting, Nat. History Rooms. Ordinary meetings, first Monday in month. Special meetings, when called—no special time. Annual meeting, June. Membership September 1: Honorary, 23; active, 9; corresponding, 1; total, 33. The original club has amalgamated with Nat. History Soc., and nearly all the old members are working individually, although all are in the Camera Club Dept. of Nat. Hist. Society.

CAPITAL CAMERA CLUB, WASHINGTON, D. C.—Organized May 1st, 1891. *President*, Chas. E. Fairman; *Vice-President*, Eustace Y. Collett; *Secretary*, Frank B Dante, 401 Seventh Street, N. W.; *Board of Directors*, Rev. Ernst Drewitz, Chas. Williams, Allan J. Houghton; *Treasurer*, Chas. L. Du Bois; *Room Committee*, Albert Le Breton, Lewis M. McCormick, Chas. Williams. Place of meeting, 401 Seventh Street, N.W. Ordinary meetings, first and third Saturday in each month. Annual meeting, first Saturday in May. Membership: Active, 50; total, 50. Exhibitions, annual in December.

CENTRAL Y. M. C. A. (CAMERA SECTION).—502 Fulton Street, Brooklyn, N. Y. Organized 1888. *President*, Wm. H. Lowery; *Vice-President*, E. A. Crowell; *Treasurer*, F. F. Braillard, Jr.; *Secretary*, B. A. Burger, 160–62 Atlantic Avenue, Brooklyn, N. Y. Place of meeting, "Studio," 502 Fulton Street. Ordinary meetings, first and third Thursdays of each month. Special meetings ou demand of any five members. Annual meeting, first Thursday in January. Membership September 1: Honorary, 2; active, 40; total, 42. Publication, *Y. M. C. A. Bulletin*. Exhibitions, demonstrations and reading of photographic papers at the close of each meeting. Lantern-slide exhibitions during the winter at various dates. Annual print exhibition in the fall.

CHAUTAUQUA PHOTOGRAPHIC EXCHANGE CLUB.—Organized August, 1888. *President*, Henry E. Canfield, Akron, Ohio; *Treasurer*, G. W. Hart; *Secretary*, Mrs. C. L. Pierce, 150 State Street, Brooklyn, N. Y. (in the summer months, "Elmhurst," Riverside, Conn.). Annual meeting and exhibition in August at the Chautauqua Assembly Grounds. The club is a department of the Chautauqua School of Photography, and admits only her students or graduates. Exchanges are made every three months; Membership, 38.

CHICAGO CAMERA CLUB.—182–184 Wabash Avenue. Organized May, 1889. *President*, Prof. M. L. Williston; *Vice-President*, Dr. M. R. Brown; *2d Vice-President*, Mrs. N. Gray Bartlett; *Directory*, consists of all officers and in addition Messrs. Walter Kimbark, Isaac C. Marsh, Alfred Thompson, R. E. Janney and S. E. Norton; *Treasurer*, Thos. Patterson; *Librarian*, Fred. S. Tyrrell; *Secretary*, Mr. P. E. Greer, care Club, 184 Wabash Avenue, Chicago. Place of meeting, 182–184 Wabash Avenue. Ordinary meetings, second Tuesday of each month, at 8 P.M. Special meetings for illustrated lectures, etc., at Recital Hall, Auditorium, once or twice annually. Annual meeting, second Tuesday in April. Membership September 1: Honorary, 10; active, 104; associate, 7; total, 131.

CHICAGO LANTERN-SLIDE CLUB.—Organized October, 1886. *President*, C. P. Stivers; *Executive Committee*, the officers and Dr. T. W. Sheardown and Robert Berger; *Treasurer*, Marshall Waite; *Secretary*, Walter A.

Morse, 20 Kemper Place, Chicago. Place of meeting, Masonic Temple, ninth floor. Ordinary meetings, second and fourth Wednesday evenings of each month. Annual meeting, January meeting, fourth Wednesday. Membership September 1: Honorary, 2; active, 23; total, 25.

CINCINNATI SOCIETY OF NATURAL HISTORY (PHOTOGRAPHIC SECTION).—Organized January, 1884. *President*, H. J. Buntue; *Vice-President*, A. L. Fogg; *Treasurer*, E. H. Barton; *Librarian*, Arch. I. Carsen, M.D.; *Secretary*, Edward E. Shipley, P.O. Box 285, Cincinnati, O. Place of meeting, 108 Broadway. Ordinary meetings, second and fourth Monday evenings of each month. Special meetings, on call of President. Annual meeting, first Monday of April. Membership September 1: Honorary, 1; active, 100; total, 101. Exhibitions, print exhibition. Annual outing May 30th each year. Annual lantern-slide exhibition.

CLEVELAND CAMERA CLUB.—Organized 1887. *President*, Frank Dorn; *Vice-President*, Alf. Ogier; *Executive Committee*, J. A. Duncan, Prof. J. Bolton; *Treasurer*, William Dorn; *Secretary*, Robert Dayton, M.D., 5 Euclid Avenue, Room No. 2, Cleveland, Ohio. Place of meeting, 5 Euclid Avenue, Room No. 9. Ordinary meetings, first and third Tuesdays of each month. Annual meeting, first Tuesday in December. Membership September 1: Active, 40 on the roll—about 22 attend meetings.

COLLEGE CAMERA CLUB.—Akron, Ohio. Organized November, 1890. *President*, Prof. C. M. Knight; *Executive Committee*, Prof. Wm. D. Shipman, Jean L. Sisler and O. S. Dean, with President and Secretary; *Treasurer*, Charles H. Shipman; *Secretary*, Agnes Claypole. Place of meeting, Club Rooms, Buchtel College. Ordinary meetings, the first and third Tuesdays of each month except July and August. Special meetings at private houses. Annual meeting the last Tuesday in June. Membership September 1: Active, 28; total, 28. Exhibitions the week of February 22d (opening the Saturday before).

COLUMBIA COLLEGE AMATEUR PHOTOGRAPHIC SOCIETY.—Columbia College, New York City. Organized 1886. *President*, Henry R. Taylor; *Vice-President*, George W. Giddings; *Treasurer*, Dwight W. Taylor; *Secretary*, Harry M. Brookfield. Place of meeting, Columbia College. Ordinary meetings, first and third Fridays during college term. Membership: Honorary, 24; active, 26; total, 50. Exhibitions held regularly in Spring, about April.

COLUMBUS CAMERA CLUB.—Y. M. C. A. Building, Columbus, Ohio. Organized October 6, 1884. Incorporated February, 1891. *President*, John Field; *Vice-President*, C. H. Doty; *Directors*, John Field, C. H. Doty, W. B. Kimball, C. S. Bradley, Hester C. Getz, P. P. Smythe, S. C. Bradford, J. J. Jennings, F. H. Howe; *Treasurer*, C. S. Bradley; *Librarian*, Hester C. Getz; *Secretary*, W. B. Kimball, No. 32 East Spring Street, Columbus, O. Place of meeting, Columbus Camera Club, Y. M. C. A. Building. Ordinary meetings, third Thursday of each month. Special meetings, subject to the call of the President. Annual meeting, third Thursday in December. Membership September 1: Honorary, 4; active, 60; total, 64. Annual outing May 30.

CRANFORD CAMERA CLUB.—Cranford, Union Co., N. J. Organized September 13, 1888. *President*, Wm. Chamberlain; *Treasurer*, J. M. P. Joseph; *Secretary*, A. H. Plummer, Cranford, Union Co., N. J. Place of meeting, Cranford, N. J. Ordinary meetings, first Thursday in every month. Special meetings whenever called. Membership September 1: Honorary, 1; active, 11; corresponding, 2; total, 14.

HIAWATHA CAMERA CLUB.—Minneapolis, Minn. Organized October, 1891. *President*, Dr. M. G. Jennison; *Vice-President*, Prof. J. W. Bell; *Executive Committee*, Miss F. N. Stanchfield; Mr. E. W. Kittridge, C. Alger; *Treasurer*, G. B. Eustis; *Secretary*, Charles A. Hoffman, 20 South Fourth Street, Minneapolis, Minn. Place of meeting, Public Library Building. Ordinary meetings, third Tuesday in each month. Special meetings, call of President; summers, semi-monthly outings. Annual meeting, December. Membership September 1: active, 79; corresponding, 14; total, 93. Exhibitions, every second meeting lantern-slide exhibit; February every year print exhibit. The outings and prize competitions resulting from these outings our special features. Free dark-room for visitors at 22 South Fourth St.

HOBOKEN CAMERA CLUB.—1036 Park Avenue, Hoboken, N. J. Organized March 23, 1889. *President*, A. J. Thomas; *Vice-President*, C. Sudhaus; *Board of Governors*, All officers of Club; *Treasurer*, H. J. Kaltenbachs; *Secretary*, L. W. Wolff, 1136 Garden Street, Hoboken, N. J. Place of meeting, Club Rooms. Ordinary meetings, 8.30 P.M. first Tuesday in every month. Governors' meetings, 8.30 P.M. last Friday in every month. Special Meetings, at call signed by 10 members. Annual meeting, 8.30 P.M. first Tuesday in March. Membership September 1: Honorary, 8; active, 23; associate, 13; total 44.

IF CAMERA CLUB, THE.—Jersey City, N. J. Organized November, 1891. *President*, Joseph Cottier; *Vice-President*, C. W. Edwards; *Treasurer*, Stephen Reade; *Secretary*, A. B. Guilford, 341 Webster Avenue, Jersey City, N. J. Place of meeting, corner of Congress Street and New York Avenue. Ordinary meetings, second Friday in each month, at 8 o'clock. Special meetings, at call of President. Annual meeting, second Friday in December. Membership September 1: Active, 14; total, 14. Exhibitions, two exhibitions given during winter months; outings in summer months.

INDIANAPOLIS CAMERA CLUB, THE.—Indianapolis, Ind. Organized November 18, 1887. *President*, Chas. McBride; *Vice-President*, H. C. Chandler; *Executive Committee*, John T. Harris, Rembrandt Steele, Henry Koethe; *Treasurer and Secretary*, Carl H. Lieber, 33 South Meridian Street. Place of meetings, various. Ordinary meetings, first Tuesday in each month. Special meetings on call of Executive Committee. Annual meeting, November. Membership: Honorary, 1; active, 35; total, 36.

LOUISVILLE CAMERA CLUB.—Louisville, Ky. Organized April 24, 1888. *President*, Alex. Griswold; *Vice-President*, Henry Terstegge; *Executive Committee*, C. R. Peaslee, Alex. Griswold, Henry Terstegge; *Treasurer*, R. L. Stevens, 11th and Main Streets; *Secretary*, R. L. Stevens, 11th and Main Streets, Louisville, Ky. Place of meeting, south-east corner of 3d and Main Streets. Ordinary meetings, second and fourth Thursday each month, 8 o'clock P.M. Annual meeting, second Tuesday in February. Membership: Active, 18; corresponding, 2; total, 20. Exhibitions during the fall and winter months.

LOWELL CAMERA CLUB.—Runel's Building, Lowell, Mass. Organized 1889. Incorporated 1892. *President*, Paul Butler; *Vice-Presidents*, W. P. Atwood, W. E. Badger; *Executive Committee*, George H. Stevens, F. T. Walsh, Charles Runels, and other officers of the Club; *Treasurer*, M. A. Taylor; *Librarian*, N. A. Davis; *Secretary*, George A. Nelson, 81 Appleton Street, Lowell, Mass. Place of meeting, Runels Building. Ordinary meetings, no stated meeting, all are

special meetings, subject to call of President. Annual meeting, first Tuesday in March. Membership September 1: Active, 46; associate, 1; total, 47. Exhibitions, slides and prints at various times during the year.

LYNN CAMERA CLUB, THE.—40 Broad Street, Lynn, Mass. Organized January 3, 1888. *President*, W. H. Drew; *Vice-President*, J. N. Smith; *Executive Committee*, W. H. Drew, J. N. Smith, C. A. Lawrence; *Board of Managers*, E. F. Bacheller, J. W. Tapley; *Directors' Council*, W. A. Pevear, W. B. Gifford; *Treasurer*, E. F. Bacheller; *Librarian*, J. W. Tapley, *Secretary*, Chas. A. Lawrence, Club House, 42 Broad Street, Lynn, Mass. Place of Meeting, Club House, 42 Broad Street, Lynn, Mass. Ordinary Meetings, first Tuesday in each month. Special meetings at call of President. Annual meeting, regular January meeting. Membership September 1: Honorary, 1; active, 30; total 31.

MANHATTAN CHAPTER, AGASSIZ ASSOCIATION.—New York, B. Organized 1881. *President*, Christian F. Groth; *Vice-President*, Herman Bucher, Jr.; *Trustees*, F. Kromm, W. T. Demarest, H. T. Rowley, A. Nehrbas, E. Staubrandt; *Treasurer*, Wm. S. Miller; *Librarian*, Chas. J. Miller; *Secretary*, Edward B. Miller, 141 East 40th Street, New York City. Place of meeting, 141 East 40th Street. Ordinary meetings, announced. Annual meeting, first meeting each year. Membership April 1: Honorary, 2; active, 46; total, 48. Exhibitions to be held early in 1894.

MATTAPAN CAMERA CLUB.—Mattapan, Mass.—Organized May 1890. *President*, John A. Locklin; *Lecturer*, Henry N. Locklin; *Treasurer*, Alfred L. Karcher; *Librarian and Secretary*, Erdmann Sonnenbrodt, P. O. box 83, Mattapan, Mass. Place of meeting at private residence of members. Ordinary meetings every week from October 13th to May 1st., notice of place and time. Annual meeting, first week in May Membership September 1: Honorary, 1; active, 13; total, 14. Exhibitions of lantern-slides free of charge to schools and churches. Exhibition of the New England Lantern-slide Exchange to members and friends twice a month during the months from November to May.

MINNEAPOLIS CAMERA CLUB.—26 South 6th Street. Incorporated June 17, 1892. *President*, Wm. M. Tenney; *Vice-President*, W. Channing Whitney; *Board of Directors*, includes the President, Vice-President, Secretary and Treasurer, and the following members, W. T. Rolph, F. E. Haynes, W. B. Augir, R. M. Bennett, R. D. Cleveland, J. M. Greaves; *Treasurer*, Charles S. Fellows; *Secretary*, A. L. Eidemiller, 306 Nicollet Avenue, Minneapolis, Minn. Place of meeting, 26 South Sixth Street. Ordinary meetings, second Wednesday of each month, at 8 P.M. Special meetings at the call of the President. Annual meeting, April meeting. Membership May 1, 1893: Active, 40; associate, 4; total, 44. Exhibitions every Wednesday night, consisting of demonstrations, lectures, and lantern-slides.

MONTREAL CAMERA CLUB.—Montreal. Organized 1890. Incorporated 1892. *President*, Prof. D. P. Penhallow, F.R.S.C., F.R.M.S.; *Vice-President*, Charles F. Dawson; *Executive Committee*, Alex. Henderson, J. J. Macintosh, John Tough, Geo. R. Prowse, E. Stanger, A. J. Ferguson; *Secretary-Treasurer*, Alfred W. Cole, P. O. Box 2073, Montreal. Place of meeting, Club Room, Y. M. C. A. Building, Dominion Square. Ordinary meetings, first Monday each month from October to June. Special meetings, third Monday in each month, consisting

of practical demonstrations. Annual meeting, first Monday in May. Membership September 1: active, 90. Exhibitions regularly held during the year. Studio and developing rooms always open, and members of other photographic clubs permitted to use them during stay in the city.

MYSTIC CAMERA CLUB.—Medford, Mass. Organized June 4, 1889. Incorporated March 17, 1891. *President*, B. D. B. Bourne; *Vice-President*, H. A. Huff; *Executive Board*, B. D. B. Bourne, H. A. Huff, George S. T. Fuller, John F. Wade, Jos. B. Thaxter, Jr., Charles D. Tucker, John M. Preston; *Treasurer*, John F. Wade; *Librarian*, F. A. Newcomb, Jr; *Historian*, Will C. Eddy; *Secretary*, Geo. S. T. Fuller, 35 Dexter Street, Medford, Mass. Place of meeting, Riverside Block, Main Street. Regular meetings, first and third Tuesdays of each month. Special meetings at the call of the Executive Board. Annual meeting, January 1st. Membership January 1: Honorary, 4; active, 40; total, 44. Annual exhibition held in April.

NEWARK CAMERA CLUB.—823 Broad Street, Newark, N. J. Organized April 18, 1888. *President*, Thomas A. Hine; *Vice-President*, J. M. Foote; *Executive Committee*, W. Archibald, Harry W. Smith, Wm. A. Halsey, Charles Le Roy, Frank S. Olds, A. C. Munn, H. C. McDougall, J. M. Foote, Fred. A. Schuetz (9 in all); *Treasurer*, C. G. Hine; *Secretary*, D. S. Plumb, 24 Boudinot Street, Newark, N. J. Place of meeting, 828 Broad Street. Ordinary meetings, second and fourth Monday evenings in each month. Special meetings, subject to call of President. Annual meeting, second Monday evening in April. Membership September 1: Honorary, 11; active, 59; associate, 8; total, 78. Exhibitions, two each year, spring and autumn, for club lantern slides. Print exhibitions when deemed advisable by the Executive Committee.

NEW ORLEANS CAMERA CLUB.—No. 12 Union Street, New Orleans, La. Organized December 17, 1886. Incorporated May 3, 1888. *President*, L. E. Bowman; *Vice-President*, Major James B. Quinn, U. S. A.; *Board of Directors*, L. E. Bowman, Major James B. Quinn, R. S. Charles, Jr., S. L. Mitchell, Percy S. Benedict, H. C. Delery, W. W. Boullemet, E. L. Pinac, E. M. Haskell; *Treasurer*, S. L. Mitchell, *Librarian*, Wm. Beer (address Howard Library); *Secretary*, R. S. Charles, Jr., care Illinois Central R. R. Co., Howard Avenue and Rampart Street. Place of meeting, 12 Union Street. Informal meetings every Friday at 8 P.M. Business meetings, second Friday of every month. Annual meeting, first Wednesday of November. Membership September 1: Honorary, 12; active, 123; corresponding, 9; total, 144; Exhibitions, Lantern-Slides once each month (no regular date); Print exhibitions (competitive), May; Lantern-Slide exhibitions (competitive), October.

NEW YORK CAMERA CLUB.—314 Fifth Avenue, New York City. Incorporated December 12, 1888. *President*, William J. Cassard; *Vice-President*, S. W. Bridgham; *Board of Trustees*, W. J. Cassard, Samuel W. Bridgham, D. Williams, W. Townsend Colbun, T. Manning, R. J. Devlin, W. A. Fraser, Franklin Harper, Harry B. Reid; *Treasurer*, R. J. Devlin, M.D.; *Librarian*, C. W. Stevens, M.D.; *Secretary*, Harry B. Reid. Stated meetings first Monday of each month, except January, June, July, August, September. Annual meeting, second Wednesday in January. Membership September 1: total, 102. Exhibitions annually (March).

OLD COLONY CAMERA CLUB.—Rockland, Mass. Organized February 1, 1890. *President*, David Smith; *Vice-President*, Emery H. Jenkins; *Treasurer*, Pearl Arnold; *Secretary*, Horace W. Studley, Rockland, Plymouth Co., Mass. Place of meeting, Smith's Block, Liberty Street. Ordinary meetings appointed. Special meetings, Saturdays alternately, at 7½ P.M. Annual meeting first Saturday in June. Membership September 1: active, 11; corresponding, 1; total, 12. Exhibitions of lantern-slides every special meeting.

PATERSON Y. M. C. A. CAMERA CLUB.—141 Ellison Street, Paterson, N. J. Organized May, 1893. *President*, C. M. Giles; *Vice-President*, H. W. Gledhill; *Executive Committee*, C. M. Giles, H. W. Gledhill, Chas. D. Cooke, Wm. Ginder, Wm. M. Moore, Frank B. Hoagland; *Treasurer*, Wm. M. Moore: *Librarian*, Frank B. Hoagland; *Corresponding Secretary*, Chas. D. Cooke; *Recording Secretary*, Wm. Ginder. Place of meeting, Y. M. C. A. Building, 141 Ellison Street, Paterson. Ordinary meetings, first Monday of each month, at 8 P.M,, unless that occurs on a holiday, then one week earlier. Special meetings upon call of the President or Executive Committee, at 8 P.M. Amateurs from other clubs and all others interested are invited to all meetings and will be cordially welcomed. Annual meeting, first Monday in May. Membership September 1: Honorary, 1; active, 33; total, 34. Exhibitions to be arranged for later. Outings, or field days, are usually arranged for legal holidays in summer and fall. Will have dark-room when completed that will be at the service of visiting amateurs.

PHILADELPHIA PHOTOGRAPHIC SOCIETY, THE.—10 South Eighteenth Street, Philadelphia. Organized 1862. *President*, Joseph H. Burroughs; *Vice-Presidents*, Edmund Stirling, Charles R. Pancoast; *Board of Directors*, the five officers and also the following: John C. Browne, John G. Bullock, John Carbutt, Samuel Castner, Jr., J. Hunter Ewing, Herbert M. Howe, M.D., Frederic E. Ives, Caspar W. Miller, William H. Rau, Anthony W. Robinson, Samuel Sartain. George M. Taylor; *Treasurer*, George Vaux, Jr.; *Secretary*, Robert S. Redfield, 1601 Callowhill Street, Philadelphia. Place of meeting, 10 South Eighteenth Street. Ordinary meetings, second Wednesday evening of each month, excepting July, August and September. Conversational meetings, fourth Wednesday evening of each month, all at 8 o'clock. Annual meeting, second Wednesday evening in April. Membership April 12, 1893: Active and life, 194. Publication, *The Journal of the Photographic Society of Philadelphia*. Exhibitions, triennial, under agreement with The Boston Camera Club and The Society of Amateur Photographers of New York.

PHOTOGRAPHIC ASSOCIATION OF CANADA.—Organized January, 1884. *President*, J. C. Walker (Toronto); *Vice-Presidents*, A. M. Cunningham (Hamilton), F. Cooper (London), S. J. Jarvis (Ottawa); *Executive Committee*, the officers; *Secretary-Treasurer*, E. Poole, St. Catharines, Ontario. Place of meeting, Toronto. Annual meeting, "fall" of each year. Exhibitions annual. A live institution considering circumstances.

PHOTOGRAPHIC SOCIETY OF WATERBURY, THE.—Organized May, 1888. *President*, H. W. Hayden; *Vice-President*, H. T. Steadman; *Executive Committee*, Frank Welton, Fred Root, H. G. Filley, Mrs. H. T. Steadman, Miss Alice Depew; *Treasurer*, E. W. Mooring; *Secretary*, C. R. Russell, 44 Grove Street, Waterbury, Conn. Place of meeting, Brown's Block, South Main Street. Ordinary meetings, first and third Tuesday of each month. Membership September 1: Active, 66. Exhibitions, every two weeks.

PHOTOGRAPHICAL SECTION OF THE AMERICAN INSTITUTE.—Organized March 26, 1859. *President*, Henry J. Newton; *Vice-President*, Cornelius Van Brunt; *Executive Committee*, officers of the Section; *Treasurer*, Edward Schell; *Librarian*, John W. Chambers; *Secretary*, Oscar G. Mason, Photographical Department, Bellevue Hospital, New York City. Place of meeting, 111-113-115 West 38th Street, New York City. Ordinary meetings, first Tuesday in each month, at 8 P.M., except July and August. Special meetings upon call of officers. Annual meeting, first Tuesday in February. Membership September 1: Active, about 2000. All members of the Institute are by virtue of such membership also members of all the various Sections. Exhibitions, autumn of each year.

PITTSBURGH AMATEUR PHOTOGRAPHERS' SOCIETY. — Academy of Science and Art. Organized 1886. *President*, W. S. Bell; *Vice-President*, W. S. Clow; *Executive Committee*, C. C. Craft, L. S. Clarke, O. H. Darlington, Horace Moorhead; *Treasurer*, Wm. J. Hunker; *Librarian*, George Heisey; *Secretary*, Jos. H. Hunter, 248 Centre Avenue, Pittsburgh, Pa. Place of meeting, Academy of Science and Art. Ordinary meetings, second Monday of each month. Special meetings, when called by the President or three members of society. Annual meeting, April. Membership September 1: Honorary, 3; active, 67; total, 70.

PLAINFIELD CAMERA CLUB.—17 East Front Street, Plainfield, N. J. Organized June 7, 1888; incorporated September 13, 1890. *President*, Oscar S. Teale; *Vice-President*, Geo. H. Babcock; *Board of Directors*, O. S. Teale, G. H. Babcock, Harold Serrell, H. H. Coward, Otto Arens, J. Hervey Doane; *Treasurer*, Harold Serrell; *Historian*, F. R. Stevens; *Secretary*, H. H. Coward, 79 East Front Street, Plainfield, N. J. Place of meeting, Club Rooms, 17 East Front Street, Ordinary meetings, first and third Tuesdays of each month. Special meetings, on call of President. Annual meeting, third Tuesday in December. Membership September 1: Honorary, 3; active, 50; associate, 8; total, 61. Exhibitions, annual print exhibition held the last week in November.

PORTLAND CAMERA CLUB.—Organized February 6, 1890. *President*, Franklin M. Lawrence; *Vice-President*, Stanley P. Warren, M.D.; *Secretary*, Frederic S. Bullard; *Treasurer*, Clayton T. Whipple; *Executive Committee*, Nathan Clifford, Philip G. Brown, W. C. King, F. H. Little. Place of meeting, Rooms in Society of Art Building, Deering Place, Portland, Me. Regular meetings on first Tuesday of each month, excepting July and August. Annual meeting on first Tuesday in February. Membership: Honorary, 4; active, 50. The Club is member of the Amateur Lantern Interchange, also The New England Exchange. Lantern exhibitions and lectures given during the winter season, and social meetings on third Tuesday in each month.

POSTAL PHOTOGRAPHIC CLUB.—First album sent out December 1888. *President*, Randall Spaulding, Montclair, N. J.; *Treasurer and Secretary*, F. E. Fairbanks, Fitchburg, Mass. Membership April 1: Active, 20. Publication, one album each month, which is circulated among the members and accompanied by a note-book.

PROVIDENCE CAMERA CLUB.—87 Weybosset Street, Room 47. Organized 1883. *President*, Charles A. Stoddard; *Vice-President*, J. E. Davison; *Executive Committee*, Chas. A. Stoddard, R. C. Fuller, E. Q. Gladding, S. B. Burnham, E. A. Darling, W. A. Dean, A. W. Howe, Geo. W.

Lake, J. A. Miller, Jr.; *Treasurer*, E. A. Darling; *Librarian*, G. Edwin Sawin; *Corresponding Secretary*, W. A. Dean, 87 Weybosset Street, Room 47, Providence, R. I. Place of meeting, Swarts Building, 87 Weybosset Street. Ordinary meetings, first Tuesday of each month, at 8 P.M. Annual meeting, regular meeting in June. Membership September 1: Associate, 9; active, 66; total, 75. Exhibitions, one annual exhibition; lantern exhibition frequently held.

QUEBEC CAMERA CLUB.—Quebec, Canada. Organized 1887. *Vice-President*, Capt. J. George Garneau; *Executive Committee*, J. B. Amyot and Captain Imlah; *Treasurer*, James Brodie; *Secretary*, Capt. Ernest F. Wurtele, R.L., Quebec, Montmorency and Charlevoix Railway Company, Quebec, Que. Place of meeting, Captain Imlah's Quarters, Citadel. Annual meeting, first Monday in December.

ST. PAUL CAMERA CLUB.—Organized March 6, 1893. *President*, A. M. P. Cowley; *Vice-President*, D. F. Brown; *Secretary*, W. J. Sonnen; *Treasurer*, Wm. B. Thorne; *Board of Directors*, James Paris, Ed. E Zimmerman, C. H. Buckley, Andrew Thaanum, Lorn Campbell, T. S. Kellogg, and above officers; *Standing Committees*: House Committee, D. F. Brown, Wm. R. Thorne. Ed. F. Zimmerman; Membership Committee, C. H. Buckley, W. J. Sonnen, T. S. Kellogg; Lantern Committee, James Paris, Andrew Thaanum, Lorn Campbell; Committee on Meetings, Ed. F. Zimmerman, A. M. P. Cowley, James Paris. Regular meetings, second Tuesday of each month. Club rooms, afrer May 1st, 14 East 30th Street; large meeting room second floor; third floor, 22 x 80 feet, with skylight, dark-rooms, printing and work rooms, etc. Temporary quarters top floor Fire and Marine Insurance Building.

SCHUYLKILL CAMERA CLUB.—Pottsville, Pa. Organized July 5, 1889. *President*, A. W. Sheafer; *Vice-President*, Miss Elena Roads; *Executive Committee*, A. W. Sheafer, Elena Roads, B. S. Simonds, W. L. Sheafer; *Treasurer*, W. L. Sheafer; *Librarian-Secretary*, B. S. Simonds, "The Orchard," Pottsville, Pa. Place of meeting, club rooms, Second and Market Streets. Ordinary meetings, last Friday of each month, 8 P.M. Special meetings, call of President. Annual meeting, February. Membership September 1: Honorary, 4; Active, 65; corresponding, 41; total, 110. Exhibitions, two a month for members; public in January or February.

SOCIETY OF AMATEUR PHOTOGRAPHERS OF NEW YORK.—*President*, R. A. B. Dayton; *Vice-President*, L. B. Schram; *Board of Directors*, R. A. B. Dayton, L. B. Schram, T. J. Burton, W. F. Hapgood, C. C. C. C. Roumage, C. Van Brunt, R. L. Bracklow, F. C. Elgar, E. Warrin, H. S. Mack, H. A. Smith, A. P. Schoen; *Treasurer*, C. C. Roumage; *Librarian*, R. L. Bracklow; *Secretary*, T. J. Burton, 113 West 38th Street. Place of meeting, 113 West 38th Street. Ordinary meetings, second Tuesday each month, except July and August. 8 P.M. Special meetings, on call of President. Annual meeting, second Tuesday in April. Membership September 1: Honorary, 14; active, 147; sub., 34; corresponding, 48; total, 243. Exhibitions, members' exhibition (print) every Spring. Lantern exhibition fourth Friday each month. Seventh joint exhibition under the auspices of the Society of Amateur Photographers of New York at galleries of American Fine Arts Society, 57th Street and Broadway, April 16th to Agril 29, 1894. Open to all photographers.

SPRINGFIELD CAMERA CLUB.—Springfield, Mass. Organized October 11, 1886. *President*, Lewis J. Powers, Jr.; *Executive Committee*, Lewis J. Powers, Jr., Chas. C. McElwaine, Wm. M. Lester, Hinsdale Smith, Jr. and C. A. Emery; *Treasurer*, Wm. M. Lester; *Librarian*, Hinsdale Smith, Jr.; *Secretary*, Chas. C. McElwain, P. O. Box 1528, Springfield, Mass. Place of meeting, at club room, 465 Main Street. Ordinary meetings, third Wednesday in each month at 7.30 P.M. Special meetings, at call of majority of Executive Committee. Annual meeting, third Wednesday in October at 7.30 P.M. Membership September 1st: Honorary, 5; active, 50; total, 55. Exhibitions, exhibition of the slides of N. E. Lantern Slide Interchange held at every meeting during the winter. Exhibition of prints held once a year; this year will be held May 15–20, 1893.

SYRACUSE CAMERA CLUB.—Organized 1886; incorporated January, 1892. *President*, Amos Padgham; *Vice-President*, Geo. Timmins; *Directors*, Amos Padgham, George Timmins, Herbert F. Smith, E. C. Howe, E. H. Burdick, Fred. Frazer, J. R. Clancy and J. D. Pennock; *Lantern Slide Director*, Will H. Olmsted; *Treasurer*, Edward C. Howe; *Secretary*, Herbert F. Smith, 1316 Spring Street, Syracuse, N. Y. Place of meeting, 322 South Saline Street, Syracuse, N. Y. Ordinary meetings, every Friday evening at 8 o'clock. Annual meeting, first Friday evening in January. Membership September 1: Active, 80; associate, 12; total, 92. Club Outings, May and October in each year. Public slide exhibitions in March each year. Print exhibitions occasionally.

"TECH" CAMERA CLUB OF THE WORCESTER POLYTECHNIC INSTITUTE, THE.—Worcester, Mass. Organized September 28, 1889. *President*, Edward W. Vail, Jr.; *Vice-President*, Henry N. Smith; *Executive Committee*, Edward Keith, Howard Bracken, A. H. Smith, A. C. Higgins, Everett Kent, Harry Sinclair; *Treasurer*, Howard A. Coombs, *Keeper*, Edward H. Keith; *Secretary*, Harry Sinclair, P. O. Box 834, Worcester. Place of meeting, Boynton Hall. Ordinary meetings, once in two weeks, Saturday, 7.45 P.M., beginning the second Saturday of the school year. Special meetings, at the call of the Executive Committee. Annual meeting, September, third week. Membership September 1: Honorary, 5; active, 20; corresponding, 2; total, 27. Exhibitions are held at the school during the fall term of each year.

TOLEDO CAMERA CLUB, THE.—Toledo, O. Organized December 3, 1890. *President*, F. C. Wade; *Vice-President*, Rev. C. Scodding; *Executive Committee*, F. C. Wade, Rev. C. Scodding, C. H. Walbridge, H. J. Colburn and M. A. Martin; *Treasurer*, M. A. Martin; *Librarian*, E. M. Harter; *Secretary*, M. A. Martin, 602 Summit Street, Toledo, O. Place of meeting, club rooms, Sheridan Block. Ordinary meetings, first Monday in every month. Special meetings, called by President. Annual meeting, first Monday in December. Membership September 1: Honorary, 4; active, 50; total, 54. Exhibitions, annual, second week in January. Lantern slide exhibitions given nearly every monthly meeting.

TORONTO CAMERA CLUB, THE.—Toronto, Can. Organized March 17, 1887; incorporated January 19, 1893. *President*, E. Havelock Walsh; *First Vice-President*, A. W. Croil; *Second Vice-President*, W. H. Moss; *Executive Committee*, Hugh Neilson, N. A. Powell, M.D., Prof. W. H. Ellis, M.D., J. G. Ramsey, George H. Gooderham and G. Townsend; *Treaurer*, Rupert G. Muntz; *Secretary*, Ernest M. Lake, Room 6, 17 Jordan Street, Toronto. Place of meeting, second floor, corner

Yonge and Gerrard Streets. Ordinary meetings, every Monday evening from October 1st to May 1st. Special meetings, first Monday in each month; "club night" open to members and friends; programme and exhibition of slides, 8 P.M. Annual meeting, first Monday in November. Membership September 1: Honorary, 1; active, 125; corresponding, 1; total, 127. Exhibitions, held annually in January or February of each year. Memo.—This club was formerly known as "The Toronto Amateur Photographic Association," and the name was changed as above at the annual meeting of 1891.

UNIVERSITY CAMERA CLUB, THE.—Lincoln, Neb. Organized January 8, 1892. Regular meetings, first Tuesday evening of each month in Chemical Laboratory. *President*, H. A. Senter: *Vice-President*, U. G. Cornell; *Secretary*, Rosa Bouton.

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Essen und Benachbarte Städte. Photographische Genossenschaft.—Addr. Hügel-Str. 49, Essen a/Ruhr.

Frankfurt a/M. Amateur Photogrphen-Verein.—Addr. Restaurant Hartmann, Bockenheimer Thor.

Frankfurt Club von Amateur-Photographen.—Addr. Gustav Rapp, Kröger-Str. 2.

Frankfurt Verein zur Pflege der Photographie und verwandter Künste.—Addr. T. W. Geldmacher.

Halle a/S. Photographische Gesellschaft.—Addr. K. Knapp, Mühlweg 19.

Hamburg-Altona Photographische Gesellschaft.—Addr. Hermann Köster, Hamburg, Stein-Str. 58.

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Jena Gesellschaft von Freunden der Photographie.—Addr. Carl Zeiss, Optische Werkstätte.

Kiel Photographische Gesellschaft.—Addr. to Küter-Str., No. 8.

Leipzig Verein von Photographen-Gehilfen.—Addr. G. Keller, Atelier Naumann.

Liegnitz Amateur Photographen-Verein.—Addr. Ober-Post-Assistent Engler.

Magdeburg Photographischer Club.—Dr. H. Bennewitz.

Magdeburg Photographen-Verein.—Addr. H. Lübeck, Breiteweg 165.

München Photographische Gesellschaft.—Addr. Otto Wernhard, Sonnen-Str. 24.

München Photographischer Club.—Addr. C. Mebelacker, Schwanthaler-Str. 34

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Schlesische Gesellschaft von Freunden der Photographie zu Breslau.—Addr. Professor Kleinstüber, Bismark-Str. 11.

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Prague Club der Amateur-Photographen (Klub fotografu amatéru v. Praze).—Addr. Bretistav Cirniy, Bartolomaigasse, 307, Prag, I.

Reichenberg Club der Amateur-Photographen.—Addr. Dr. Ulbrich, Wiener-Str. 26, Reichenberg B.

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Vienna Photographische Gesellschaft.—Office, Carmelitergasse 7, Wien II.

Vienna Verein Photographischer Mitarbeiter.—Addr. Rudolf Perlmann, Barmherzigengasse 22, Wein III/I.

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Haarlemsche Amateur Fotografen Club.—Haarlem, I. Bes.

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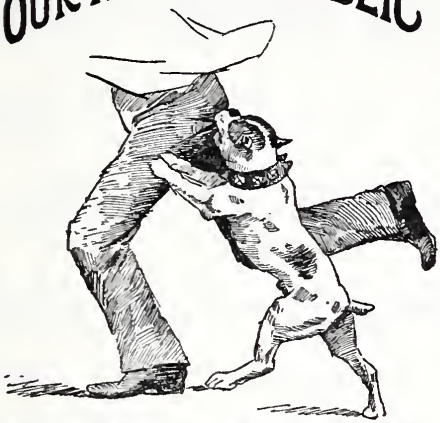

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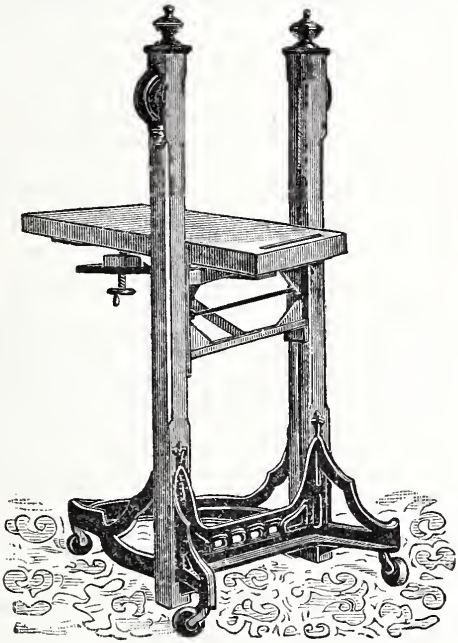

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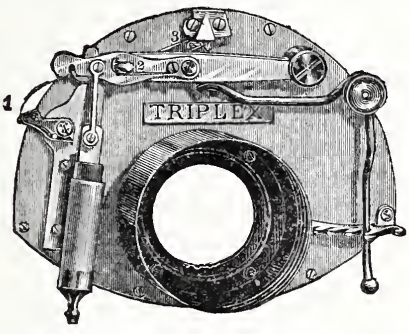

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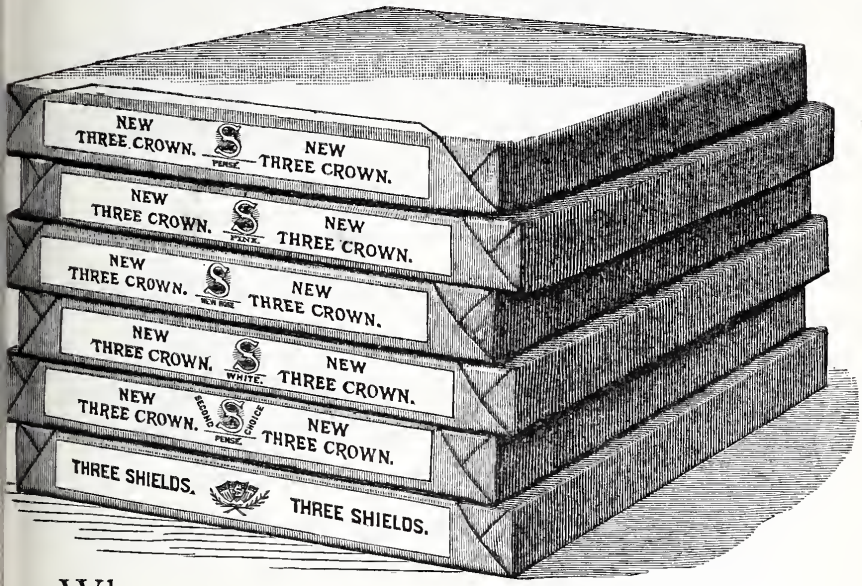

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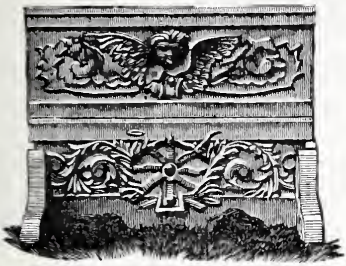

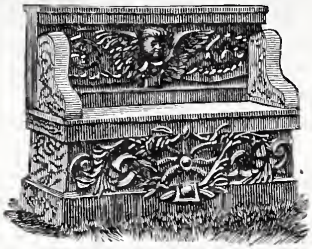

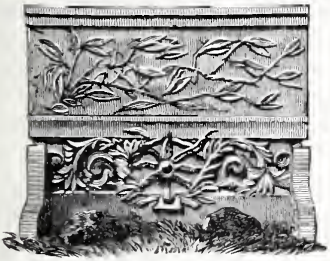

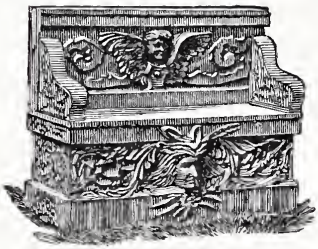

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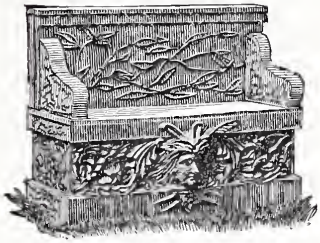

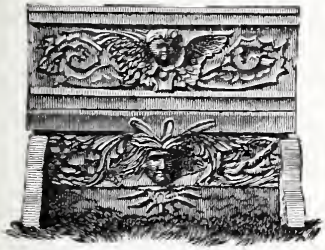

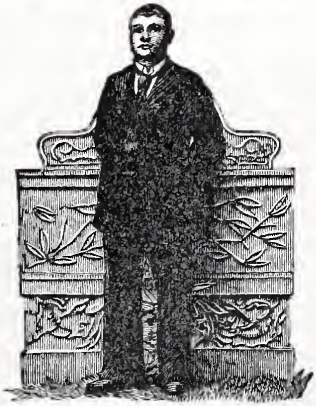

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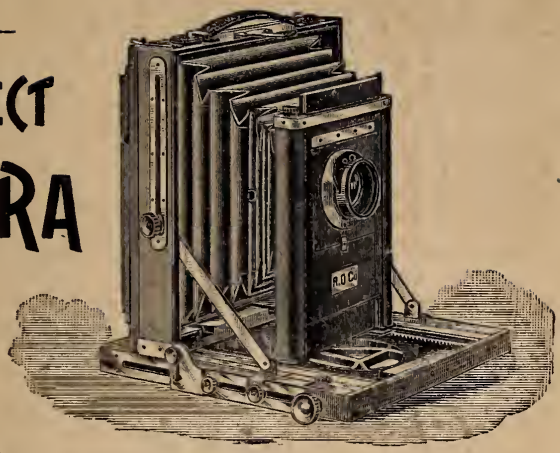

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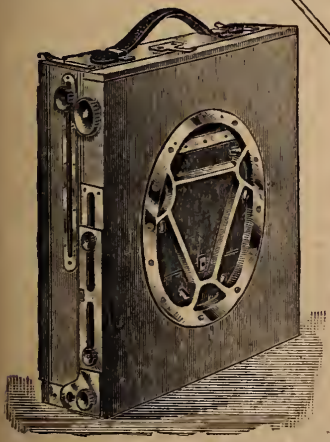

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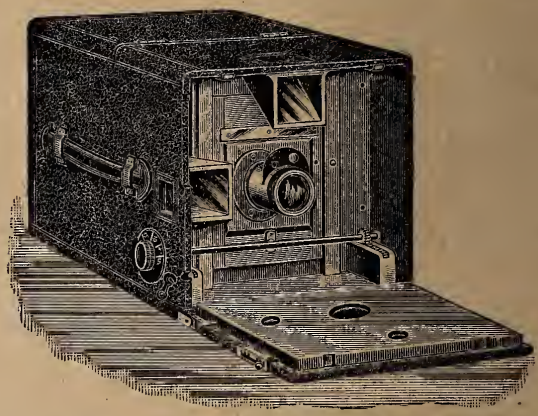

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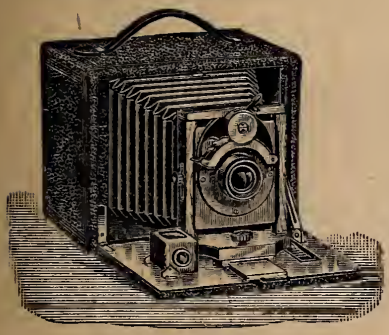

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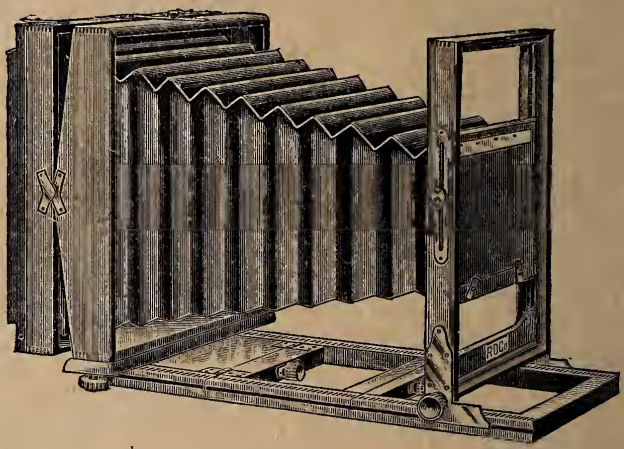

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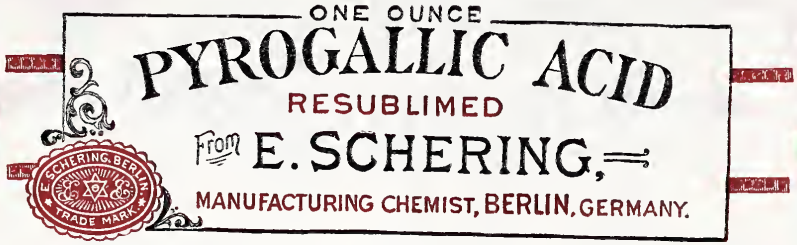

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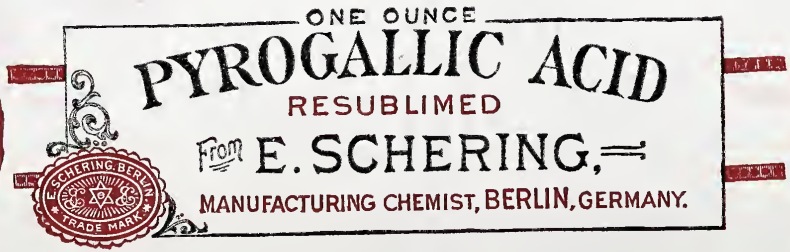

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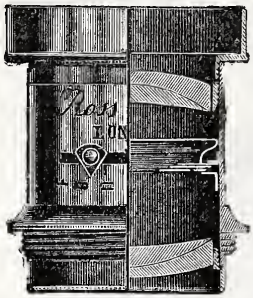

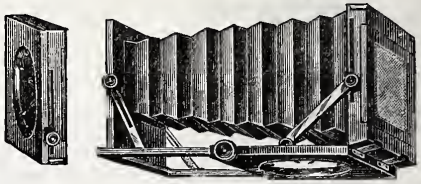

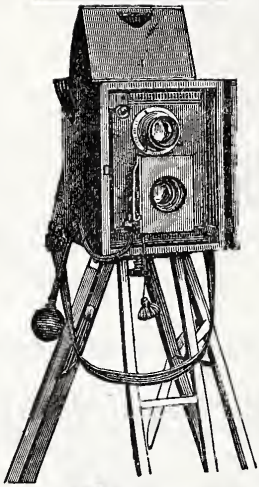

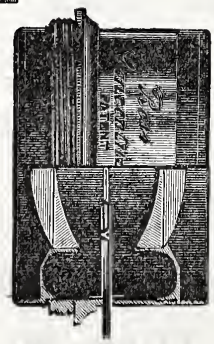

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All the latest Hand and Tripod Cameras.

Descriptive Catalogues of any of the above sent on receipt of 5 cent stamp for postage.

W. C. CULLEN,

61 William St., New York.

THE

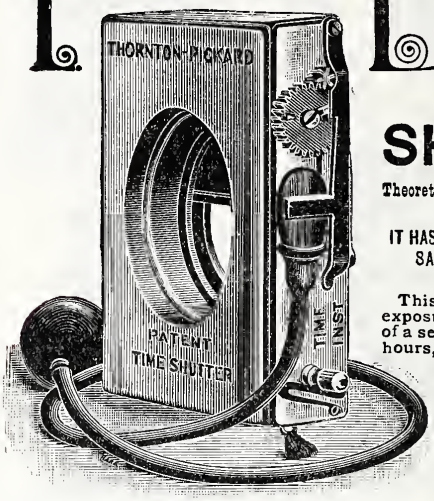
THORNTON-PICKARD

PATENT

"TIME"

AND INSTANTANEOUS

SHUTTER.



Theoretically and Practically the Best.

IT HAS BY FAR THE LARGEST SALE IN THE WORLD.

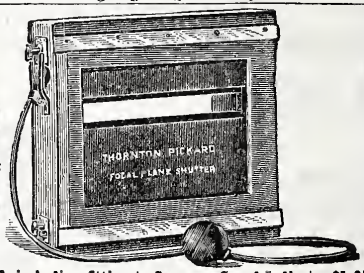
This Shutter gives any exposure from the fraction of a second to minutes or hours, without shaking the Camera.

It is made of best mahogany, French polished, and finished in the very best style.

Prices { To fit Lens Hood or Tube up to 1½ inches.....Price $6.50 } Other sizes in
" " " " " 2 " ..... " 7.25 } proportion.
Speed Indicator (strongly recommended).....Extra, $1.25

Send for a Catalogue giving Prices of all Sizes.

"FOCAL PLANE" SHUTTER



The "Focal Plane" Shutter works just in front of the plate and is fitted between the Dark Slide and the Camera.

The blind is provided with an adjustable slit, which allows of any exposure from 1-20 to 1-1000 of a second.

Reproductions of some remarkable photos will be found in our Catalogue which can be had post-free.

Price from $12.60, including fitting to Camera—Speed Indicator $1.25 extra.

TESTIMONIALS.

"I may say that I have tested a number of Shutters, and am satisfied that the Thornton-Pickard is the first."—T. D. W.

"I consider it simply invaluable, and certainly the most perfect in principle that is in the market, and I am very much pleased with its performance."—J. H. J.

"I consider the Shutter out and away the best in the market. I am also using a smaller-sized Time Shutter on my hand camera, and find it most efficient."—L. M.

"I have tried the Focal Plane Shutter, and find it works splendidly. I am very much pleased with it."—M. E.

"With the Focal Plane Shutter I got a result which I never got before in the matter of rapidity and exposure combined."—A. P.

"The Focal Plane Shutter gives my customers great satisfaction."—E. B.

The above are *bona-fide* and unsolicited testimonials.

Shutters may be obtained direct and through all Photographic Supplies.

THE THORNTON-PICKARD MANUFACTURING COMPANY,

ALTRINGHAM, near MANCHESTER, ENGLAND.

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MANUFACTORY

OF

PHOTOGRAPHIC PAPERS

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Malmedy, Germany.

Plain Paper in sheets for Albumenizing and various processes

Plain Paper in rolls for:

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Platinotype
Emulsion
Aristotype
Drawings—Copies { black and blue lines on white ground. white lines on blue ground.

Albumen Paper

(Water-Mark)

German Paper

Best selected paper of high gloss, free of the imperfections often to be found in other brands—Cheap price.

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for Aristotype Process

In all desired Tints and of Unrivaled Quality.

"The Developer of the Future."

"PARA."

Para-amidophenol Hydrochlorate.

With "Para" Developer there is no staining of the film, as with eikonogen and hydrochinon; when development is prolonged, absolute transparency and opacity is secured, and the time of exposure is reduced about 30 per cent. without injury to half-tones and middle-tints.

Formula for Developer.

Para-amidophenol (pure)	100	grains
Sodium sulphite (crystals)	3	ounces
Potassium carbonate	1½	ounces
Water	32	ounces

For use, take 1 ounce of the above solution and from 2 to 4 ounces of water, according to the length of exposure.

The stronger the solution the greater the intensity of the resulting negative; the more diluted the solution the greater softness and more detail.

Pure Para-amidophenol Hydrochlorate.

PRICE, in ½ ounce bottles, - - - - **65c. per Bottle.**

S. P. C. "PARA" DEVELOPER

IN ONE SOLUTION.

An eight (8) ounce bottle containing developer sufficient for developing one hundred 5 x 8 negatives.

PRICE, - - - - - - - - **50 Cents.**

SCOVILL & ADAMS TIME AND INSTANTANEOUS SHUTTER.

That the substitution of a pneumatic release for the ordinary trigger on a wood drop-shutter greatly enhances its value, "goes without saying."

THE SCOVILL & ADAMS TIME AND INSTANTANEOUS SHUTTER

Is Fitted with Pneumatic Attachment,

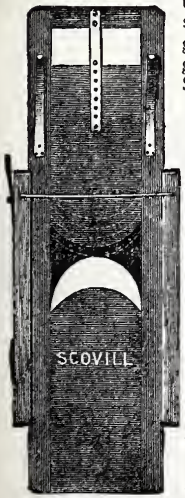
which may be worked at a considerable distance from the Camera, thus enabling the operator to form part of a group or to be included in a view he is photographing. This Shutter may be used for either timed or instantaneous exposures; the change is made by simply moving a switch.

Scovill & Adams Safety Shutter, with Time and Instantaneous Attachment.

Scovill & Adams Universal Safety Shutters.

This Shutter is styled Universal, not only because more of the Scovill & Adams Safety Shutters are in use than of any other pattern, but because it can be arranged with a variety of openings, from ¼ to 4 inches at the centre, as shown by the dotted lines of the accompanying illustration. Uniform distribution of light over the plate is insured by the form of opening.

The brakes on all these Shutters make them safe to use, by preventing a recoil with the resulting double exposure, and the jarring common to many shutters, which in time breaks apart the glasses of a Lens where cemented together—hence the designation "Safety Shutters."

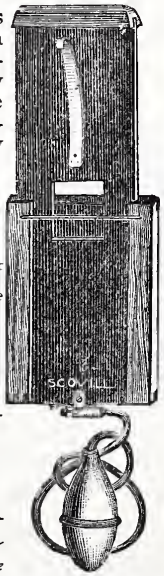


Scovill & Adams Universal Shutter.

PRICE LIST.

No.	Width of Opening in Slide.	Scovill & Adams Universal Shutters.	Universal Shutters, with Pneumatic Release.	Scovill & Adams Safety Shutters.	Safety Shutters, with Pneumatic Release.	Universal Time and Instantaneous Shutter with Pneumatic Release.
1	1¼ ins.	$2.70	$4.20	$1.20	$2.70	$4.70
2	1½ "	2.80	4.30	1.30	2.80	4.80
3	1¾ "	2.90	4.40	1.40	2.90	4.90
4	2 "	3.00	4.50	1.50	3.00	5.00
5	2½ "	3.10	4.60	1.60	3.10	5.10
6	3 "	3.25	4.75	1.75	3.25	5.25

When ordering these Shutters, exact diameter of hood of Lens should be given, so that the proper circular opening may be cut out to exactly fit hood of Lens.



Scovill & Adams Safety Shutter with Pneumatic Release.

SCOVILL Prepared SOLUTIONS. Powders and Capsules.

JUST INTRODUCED,

S. P. C. Eikoquinole Developer. Price per bottle, $0 35

S. P. C. Eikonogen Developer. Per package, 75

S. P. C. Pyro and Soda Developer. Price per Package, 60

S. P. C. Hydrochinon Developer.
Does not stain the fingers or leave the plate yellow; works equally well with all brands of plates, giving perfect detail, density and brilliancy in the negative. Full directions enclosed in each package. Price, per package, . 60

S. P. C. Pyro and Potash Developer.
Price, per package, ... 60

S. P. C. Bromide Paper Developer
for Star Bromide Paper. Set, ... 75

S. P. C. Restrainer. In accurate dropping bottle, 50

S. P. C. Developing Powders. Per box of 12, 50

Hydrochinon Capsules, . . . per box, 60

Buy from Dealers or the Scovill & Adams Company.

THE SCOVILL PREPARED SOLUTIONS, POWDERS, Etc.

S. P. C. Clarifying Solution. Per bottle, $0 50

S. P. C. Reducing Solution. Small bottle, . 50

Large bottle, ... 75

Reduces density in negatives and positives on glass or paper. Can be applied locally to remove halation marks, ghosts, etc.

S. P. C. Hypo Eliminator. (For Removing every trace of Hyposulphite of Soda from Negatives and Prints.) Price, per bottle, with book of testing paper, ... 50

S. P. C. Retouching Fluid. (For Varnished and Unvarnished Negatives.) Price, per bottle, . 25

Magnesium Flash Compound, oz. bottle, 50

Hall's Intensifier. (For Strengthening Weak Negatives.) Price, per bottle, ... 75

S. P. C. Negative Varnish. . Per bottle, 35

French Azotate. (For Toning Prints.) " " 25

Kristaline Varnish, . . . " " 40

S. P. C. Toning Solution. Per package, . . 1 00

Produces the most brilliant tones, ranging from chocolate to black on ready-sensitized paper.

S. P. C. Orthochromatic Solutions.

By which any plate may be rendered color-sensitive. Price, per package, ... 1 50

Buy from Dealers or the Scovill & Adams Company.

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PHOTO PRINTING AND BROMIDE ENLARGEMENTS A SPECIALTY.

New York Agents for

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A full line of Cameras and Supplies of all makes constantly on hand.

A New Blue Paper

Put up in Packages and also in 10-yard Rolls of all widths. This paper will be found to give the clearest whites and greatest detail of any paper now manufactured ; also

Black Line Paper

For Engineers and Architects.

Gives jet black lines on a pure white ground, and easy of manipulation.

Send for Samples and Price List.

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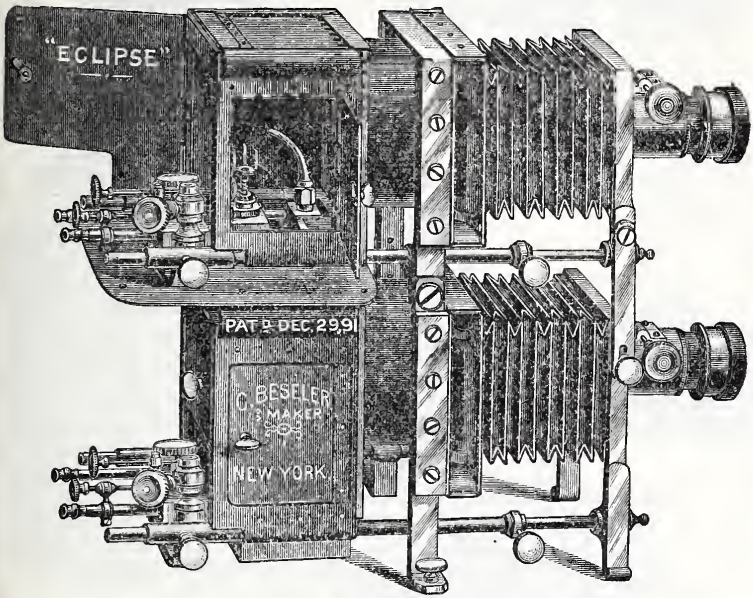
SUCCESSORS TO LOEBER BROTHERS,

111 Nassau Street, NEW YORK.

The "ECLIPSE" Dissolving Stereopticon



(Entire Weight about 35 lbs., including Carrying Case.)

CHAS. BESELER,

(ESTABLISHED 1862.)

MANUFACTURER OF

High Grade Stereopticons,
Magic Lanterns,
High Pressure Dissolving Keys,
Gas Regulators, Gas Compressors,
Gas Cylinders,

ALSO EXTRA QUALITY OF OXYGEN AND HYDROGEN GASES AND ACCESSORIES.

☞ ***Special attention given to selected Lime Pencils.***

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Near Grand Street, NEW YORK.

SEND FOR NEW CATALOGUE, ETC.

NOTE.—The "Eclipse" Stereopticon is specially adapted for exhibitors who travel from place to place, and where the size and weight of an outfit is certainly an object.

THE

Acme Sciopticon

ACME SCIOPTICON,
Complete with Double Slide Carrier
$30.

After experimenting with most of the lanterns in the market, we have come to the conclusion that for parlor or small hall exhibitions, chemical and optical experiments, etc., the ACME LANTERN affords, at a moderate price, the greatest number of advantages, and from its simplicity and non-liability to get out of order, gives, even in inexperienced hands, results superior to all others.

The ACME SCIOPTICON when packed for carrying, in its own Russia iron case, measures 15 x 10 x 6 inches, and weighs 12 pounds; the case serving as a convenient stand when the lantern is in use.

The CASE and BODY of the Lantern are of Russia iron, and neat and compact in form. That part of the body which surrounds the lamp is double, the outer cover being ornamentally perforated so as to allow a constant current of air to circulate and keep down the temperature.

The lamp is of the triple wick variety, and so constructed that the three flames combine and by the draught of a ten-inch chimney give a brilliant flame.

The CONDENSER is four inches in diameter, neatly mounted in brass, thoroughly venti lated, and arranged with screw flange so that the lenses may be separated and cleaned when required.

The CONE, which carries the objective, and the mount of that lens are nickel-plated. The objective is a double achromatic lens of one and a half inch clear aperture and five-inch focus, so that at a distance of twelve feet from the screen, it gives a brilliant picture on disc six feet in diameter. The focus is roughly obtained by sliding the front, carrying both cone and lens; and fine adjustment by a rack and pinion on the objective.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

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MANUFACTURERS OF

Photographic Lenses

Of the highest grade; of the best optical construction, and for all classes of photographic work.

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Microscopes.

For Students, Professors, Physicians and others.

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Telescopes.

Suitable for schools and private use. Guaranteed of the best quality.

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BAUSCH & LOMB OPTICAL CO.

Manufacturers of the Popular American Standard

RAPID UNIVERSAL LENSES,

for Group work in Studios and all outdoor work, and

ALVAN G. CLARK LENSES,

on both of which there has been a decided reduction in prices.

The New and Wonderful

ZEISS-ANASTIGMAT LENSES,

of which we are the Sole American Manufacturers. In six Series, for Studio, Architecture, Landscape and Copying. Special circular sued.

DIAPHRAGM SHUTTER,

which stands without rival.

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Marine Glasses,
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Etc.

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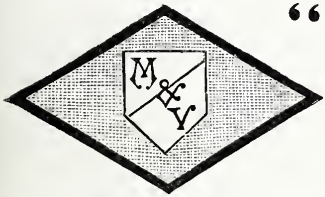

"M. & V."
"DAISY"
"EMIL"

PHOTOGRAPHIC LENSES.

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SIMPLEST,
CHEAPEST,
BEST.

FOR PROFESSIONALS AND AMATEURS.

Tones and Fixes all Brands of Collodion Paper in Operation.

HAS NO EQUAL.

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Tones and Fixes in One Operation.

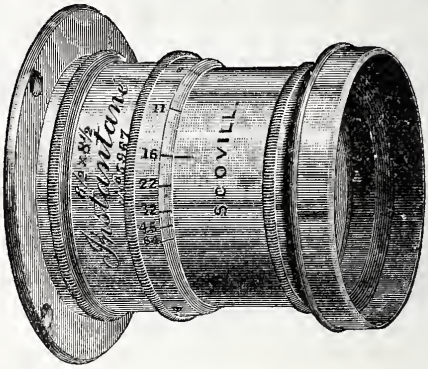
HAS NO EQUAL.

REPAIRING DEPARTMENT—
All varieties of Optical Lenses and Instruments repaired.

GOLD AND SILVER MOUNTINGS—ALUMINIUM MOUNTINGS.

THE
INSTANTANÉ LENS.

With Aluminum Mount and Iris Diaphragm.



The several lenses which form the combination of the Instantané are ground from the newly invented glass which has found such prompt recognition in Europe. By reason of the crystalline purity and whiteness of this glass, the Instantané will be found to answer the most difficult requirements in *Speed*, and to work satisfactorily when others fail.

Having such a remarkably brilliant, yet soft illumination, this lens will be found vastly superior to all others of the Rectilinear class for Portraits. Used with the full opening, it takes a portrait of very superior quality.

The Instantané Lens is perfectly Rectilinear, and entirely free from astigmatism, even when used with its full aperture. It has the most remarkable depth of focus ever produced in any lens of the character.

The Instantané is one of the few lenses that are really Aplanatic. It is guaranteed not only to cover the size plate for which it is sold, but to do this without the least loss of definition on the edge of the plate.

It has a good field, although not so forced a capacity as some, resulting in a considerably larger image of the principal object than any other lens of its size would yield, besides absolute freedom from any distortion whatever.

Price List of Instantané Lenses.

	Equiv. Focus.	
No. 1, for 4 x 5 size, instantaneous or timed photographs	6 inches	$30 00
No. 2, for 5 x 8 size	8 "	35 00
No. 3, " 6½x 8½ "	10 "	50 00
No. 4, " 8 x10 "	12 "	60 00

4x5 Instantané Lens, with Inst. Shutter and Iris Diaphragm, price $40.00.

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DRY PLATE AND FILM WORKS.

THE OLDEST DRY PLATE FACTORY IN AMERICA.

Special Brands for all Lines of Photography, Studios and the Hand Camera.

ANTI-HALATION PLATES

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ORTHOCHROMATIC
THE PLATE OF THE FUTURE.

CELLULOID FILMS
FOR PORTRAITS AND LANDSCAPES.
IN CUT SIZES, A PERFECT SUBSTITUTE FOR GLASS.

Complete list of Brands, Price List and descriptive circulars may be obtained from dealers, or will be mailed direct from the factory.

☞ MAKE YOUR PURCHASES THROUGH YOUR DEALER WHEN POSSIBLE.

JOHN CARBUTT, PROPRIETOR,

Pioneer Manufacturer of Gelatino-Bromide and Orthochromatic Plates in America,

WAYNE JUNCTION, PHILADELPHIA.

THE CARBUTT BRANDS ARE NOTED FOR THEIR RELIABLE AND UNIFORM RESULTS. NO EXPENSE BEING SPARED IN THEIR MANUFACTURE TO MAKE THEM THE ACME OF DRY PLATES.

CARBUTT'S COLUMBIAN

ANTI-HALATION PLATES

Consist of a plate with a Single Film, rich in Silver Bromide, either Orthochromatic or Eclipse, backed with **a Perfect Light Absorbing Medium.**

THE ONLY TRUE ANTI-HALATION METHOD

The Backing does not discolor the developer or soil the fingers, and is easily removed during or after development.

* * * * I have just developed the six 24 x 36 Eclipse Columbian Plates which you prepared for me, and cannot express too strongly my appreciation of the value of this Columbian Coating. These plates were all exposed in different rooms of an industrial establishment, with windows located high on both sides and end of rooms facing the camera, and although the exposures required from twenty to ninety-five minutes, there is no trace of halation on the negatives, and what is of great importance to the professional photographer, *the exposure and developing required is the same as on the ordinary plate*, and there is no difficulty in removing the backing, with the added value of no halation.

You have certainly placed a boon in the hands of the photographer whose work on interiors is often marred by intense halation.

Very truly yours,

C. H. JAMES,

PHILADELPHIA, Professional Photographer.

PRICES OF POPULAR SIZES.

	Plain.	Strippers		Plain.	Strippers		Plain.	Strippers
3¼ x 4¼	$ .55	$ .65	5 x 7	$1.30	$1.55	8 x 10	$2.90	$3.45
4 x 5	.80	.95	5 x 8	1.50	1.75	10 x 12	4.50	5.40
4¼ x 6½	1.10	1.30	6½ x 8½	2 00	2.35	11 x 14	6.00	9.15

THE CARBUTT BRANDS ARE NOTED FOR THEIR RELIABLE AND UNIFORM RESULTS, NO EXPENSE BEING SPARED IN THEIR MANUFACTURE TO MAKE THEM THE ACME OF DRY PLATES.

CARBUTT'S
ORTHOCHROMATIC
PLATES AND FILMS.

Recommended for all purposes of General Photography, but especially for those to which ordinary plates will not do justice, such as

Interiors, Flowers,
Copying Paintings,
Varied Colored Draperies in the Studio.

RESULTS IN LANDSCAPE PHOTOGRAPHY CANNOT BE EQUALED.

The only color sensitive plates on the market that are guaranteed to keep as well as ordinary plain plates.

Prices same as our plain Bromide Plates.

* * * * I want to speak a good word for the keeping qualities of your ORTHOCHROMATIC PLATES. Over a year ago I bought two boxes of your Ortho. 23 Plates, 5 x 7, one read emulsion 2476, which I think had been made over 15 months, perhaps longer, your numbers will show. I made superb negatives this month from both emulsions and had an opportunity to compare them with Ortho. plates of two other makers bought about the same time, and neither of the other makes were of any use whatever, so far as making negatives was concerned. I thought perhaps that this was due to your Ortho. plates being a slower number than the others, so I opened a box of 6 ½ x 8½ of your sens. 27, made for me a year ago last May or early in June, and produced a superb negative, which satisfied me that your Ortho. plates keep better than any other makes that I have used so far.

I forgot to mention that good negatives had been made on plates from both the other makers' boxes soon after they had been purchased, but the balance unused had spoiled, while yours remained good as when purchased fourteen or fifteen months previously.

Yours very truly,

FRANK G. CRANDALL.

THE CARBUTT BRANDS ARE NOTED FOR THEIR RELIABLE AND UNIFORM RESULTS, NO EXPENSE BEING SPARED IN THEIR MANUFACTURE TO MAKE THEM THE ACME OF DRY PLATES.

CARBUTT'S

MULTUM IN PARVO LANTERN

PRICE $6.00

Gives Abundance of Safe Light for developing highly sensitive and Orthochromatic Plates.

Direct Rays for making Lantern Slides and Transparencies.

Transmitted Opal Light for examining negatives after fixing.

CARBUTT'S LANTERN PLATES

Surpass all others in the uniform quality of results.

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GROUND GLASS TRANSPARENCY PLATES

Unequaled for uniform results, and quality of Glass used.

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CARBUTT'S COLOR SCREENS

For use with our Orthochromatic Plates.

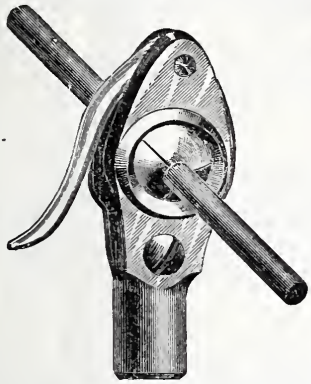
COLORS: YELLOW, ORANGE, RED, GREEN AND VIOLET.

The Yellow Screen renders the photographing of distant mountain scenery possible, while the Yellow and Orange are almost indispensable in copying Oil Paintings. The Red, Green and Violet are used for producing the negatives for the new Photochromic Processes.

THE CARBUTT BRANDS ARE NOTED FOR THEIR RELIABLE AND UNIFORM RESULTS, NO EXPENSE BEING SPARED IN THEIR MANUFACTURE TO MAKE THEM THE ACME OF DRY PLATES.

WHITE'S requisites in Posing and Lighting for the Studio.

Whites Patents



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F. W. GUERIN,
Vice-Presidents.
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FOUNDED 1795.

"Great ease and rapidity of adjustment in any desired position. A most valuable acquisition in mechanical movements, and one which, in the opinion of the judges, is in every particular worthy of the 'Highest Award' in their power to bestow."—**GOLD MEDAL.**

ANDREW J. GUSTIN,
DAVID W. POND,
SAMUEL F. SUMMERS,
Judges.

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"The joint, while being superior in the convenience and rapidity of its adjustments and firmness of its grip, and supplying a new and additional movement to the ball joint, can at the same time be more cheaply manufactured than any other device known to your committee which will accomplish the same purposes."

[Signed,] S. LLOYD WIEGAND, *Chairman of the Committee on Science and the Arts.*

[Signed,] WM. H. THORNE, *Chairman Sub-Committee.*

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By a systematic application of this new mechanical principle instant adjustment and fixation to any desired position of the subject is obtainable.

WHITE'S POSING CHAIR, with either iron or wood bases. Patented October 27, 1891. Interchangeable parts. Easily adjusted in correct proportion for a large or small person.

WHITE'S IMPROVED POSING SUPPORTS, two styles. Prices reduced.

WHITE'S IMPROVED PHOTOGRAPHIC CHAIR HEAD-RESTS, with attaching plates for furniture or other chairs. Will follow the head to all positions, and is instantly secured by a single touch.

WHITE'S BABY HOLDER. Telescoping standard. For maintaining the child comfortably in pose without showing any of the supporting means, displaying child's draperies and in scenic effects.

WHITE'S IMPROVED PHOTOGRAPHIC HEAD SCREENS, three styles. Side Shades, square, oval or round. Great range of movement in any direction.

CAMERA TRIPOD HEAD, two sizes. Camera may be instantly leveled and directed without moving tripod legs.

☞ The patterns have all been reviewed and improved and prices reduced.

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NEVER SWEATS,
NO SMOKE,
NO SOOT,
NO LUBRICATING,
QUICKEST HEATER,

THE GLOBE ENAMELER

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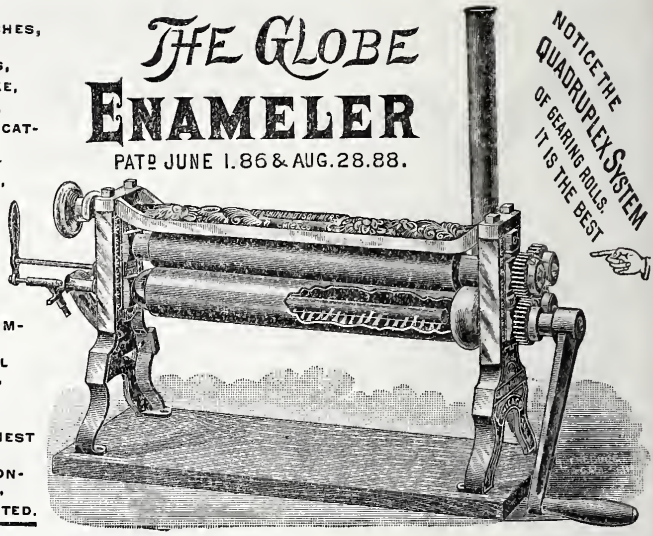
NOTICE THE QUADRUPLEX SYSTEM OF BEARING ROLLS. IT IS THE BEST



NO DISCOMFORT,
BEAUTIFUL DESIGN,
ELEGANT FINISH,
GIVES FINEST GLOSS,
MOST ECONOMICAL,
WARRANTED.

Constructed with hollow roll, having gas or gasoline burner inside, which heats roll in three to five minutes. Heat is under perfect control. Roll never sweats; never scratches. Pressure adjusted with one-hand wheel, and is always uniform. Superior to all others in all respects.

What Purchasers and Users Say of it:

"It affords me pleasure to testify that your Globe Enameler has **no equal.**"
W. J. Root, 243 Wabash Ave., Chicago.

"Have used Globe Enameler six months. It has saved its cost in gas, and is a world-beater." - - - - Edward Fritz & Co., Sedalia, Mo.

"Globe Enameler is the best I ever used. I consider all others 'not in it.'"
G. S. Barr, Mendota, Ill.

"Globe Enameler works beautifully. Such a relief from rust, oil, and sweaty rolls." - - - - - - E. R. Curtiss, Madison, Wis.

"We cannot find words strong enough to designate all its good qualities."
Elmer Chickering, Boston, Mass.

"The comfort alone of using makes the Globe the best. It is simply perfect."
A. H. Mackenzie, Dubuque, Iowa.

"We consider the Globe as near perfection as can be made."—Fieger & Son, Pomeroy, O.

"We would not take $500 for our Globe Enameler and be without one."
S. W. Dillon, Cincinnati, Ohio.

"Have used a dozen different Burnishers, but your Globe Enameler is worth more than all of them." - - - W. A. Armstrong, Milwaukee, Wis.

"Have used your Globe Enameler during the past year and would not part with it." - - - - - - F. W. Guerin, St. Louis, Mo.

"The Globe Enameler is all that we could ask for. **It has no equal.**"
Lemuel E. Friend, Birmingham, Ala.

"Cannot say too much in praise of the Globe. It beats them all."
G. M. Boiton, Rockville, Conn.

"The best investment I ever made was in purchasing the Globe Enameler. It is far superior to anything I have ever seen or used."—G. E. Howard, Altoona, Pa.

"The Globe Enameler heats in **less than three minutes**, and we think it is the finest polishing machine in the world." - Dunklee & Bau, Greenfield, Mass.

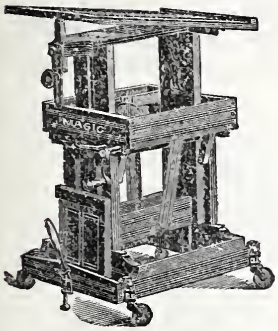
We could furnish hundreds more of equally emphatic testimonials, but we have not the space for them. Every purchaser is delighted with it.

Prices—10 in., $30.00; 15 in., $40.00; 20 in., $50.00; 25 in., $60.00.

Either Gas or Gasoline Heaters included. For sale by all dealers. Send for circulars.

JAMES H. SMITH & CO., MANUFACTURERS,
186 WABASH AVE., CHICAGO, ILL., U.S.A.

LONDON OFFICE,
LUDGATE CIRCUS, MEMORIAL HALL, LONDON, E.C., ENG.



The Magic Camera Stands,

GREATLY IMPROVED.

Although always popular, the improvements recently adopted make these the *very best Studio Stands in the market.*

ADVANTAGES.

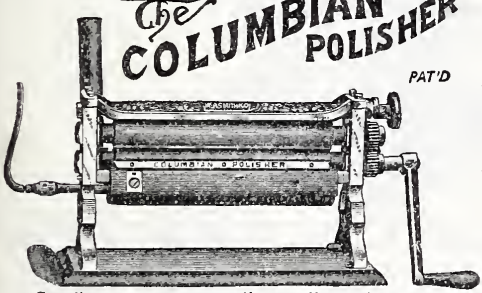
The operator can raise or lower his camera quicker and easier than with *any other stand.* The purchaser of this stand *saves freight* on 40 to 100 lbs. of iron used on some stands as weights to balance the camera, and also saves himself the labor of perpetually pulling this iron around his operating room. *We balance the weight of the camera by springs*, instead of this *burden of iron*, and a three-year-old child can easily raise the camera on this stand, or move it on the floor when its adjustable foot is raised. No set screws or cam locks are used or needed; the automatic stops bind the inside and outside frames instantly.

The top to No. 2 can be elevated to 4 feet or let down to 29 inches. Other sizes in proportion. The cam jack on rear base of No. 2 size holds stand rigid and steady on the most uneven floors. The above cut shows shape of No. 2. The larger sizes are similar in shape but No. 1 has three legs.

They are the *lightest, yet the strongest, most rigid, easiest and quickest to adjust* of any stands made. They are *well finished*, and warranted both perfect and satisfactory in every respect.

PRICES.

No. 1—8 x 10	$12.00	No. 3—14 x 17	$20.00
No. 2—8 x 10 to 11 x 14	16.00	No. 4—16 x 20 to 20 x 24	25.00



No More Roasted Operators.

No more annoying sweat on Rolls

The closed fire box with chimney draft has accomplished wonders in heating solid Rolls without sweat.

The Mechanism, Design and Finish are as perfect as the famous GLOBE ENAMELER which has in fact no rival.

Gasoline heaters are supplied to all who have no gas, and not only heat in about half the time required by the dirty, smoky oil heaters supplied with another make of solid roll machines, but these heaters are more powerful, cleaner, smokeless, and in every way more satisfactory than oil.

ADVANTAGES

It never Scratches.
Quick and Clean Heating Attachments.
It gives an Enamel Gloss.
No Discomfort from Heat.
Elegance of Design and Finish.
Rolls do not Sweat.
Automatic Springs above Bearings.
Superior Mechanism.
Lowest Price.
Pressure always Uniform
And Quickly Adjusted with one Hand Wheel.

We guarantee this Burnisher to be far superior in every essential feature to any other Solid Roll Burnisher made, the Quadruplex only excepted, and yet it will be observed our price is lower than is asked for any others of the same size and greatly inferior quality. It is therefore THE BEST AND THE CHEAPEST Solid Roll, Two Cog Machine made.

PRICES, WITH GAS OR GASOLINE HEATERS.

8 inch	$15.00	15 inch	$30.00
10 inch	22.50	20 inch	40.00

MANUFACTURED BY

JAS. H. SMITH & CO., 186 Wabash Avenue, Chicago.

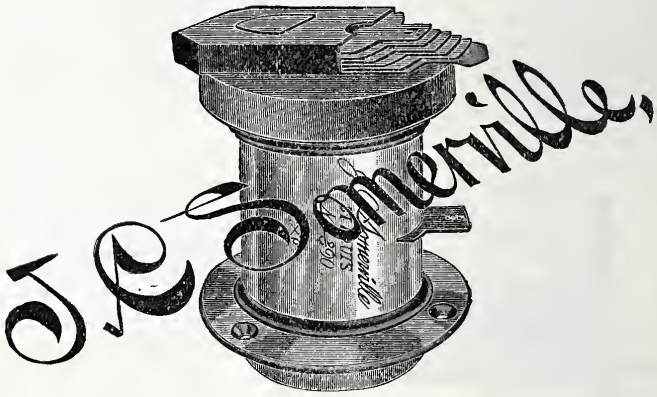
LONDON OFFICE, LUDGATE CIRCUS, MEMORIAL HALL, LONDON, E.C., ENG.

Photographic Supplies.

Somerville's New Symmetrical Lens.

Somerville's New Portrait Lens.

NEW SYMMETRICAL.



411 & 413 Washington Ave. = = ST. LOUIS.

IF YOU ARE IN WANT OF A LENS
BE SURE TO TRY OUR **LENS** BEFORE BUYING.

Will be sent subject to 5 days' trial, and, if not satisfactory, returned at my expense.

"IN USE BY MANY WHO EXCEL." SEND FOR PAMPHLET.

Somerville's Iris Diaphragm Symmetrical Lens.

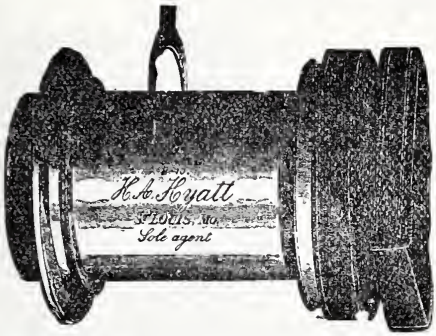
FOR SALE BY ALL DEALERS, OR

Somerville's New Wide Angle View Lens.

J. C. SOMERVILLE.

Hyatt's New Rival Lens.

THE CHEAPEST LENS IN THE MARKET.



AND EVERY ONE IS GUARANTEED.

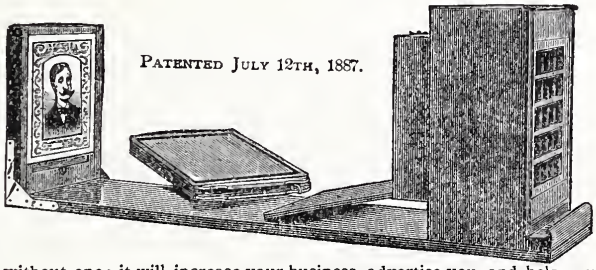
A GRAND COMBINATION OF CHEAPNESS, DEPTH OF FOCUS, FINE DEFINITION and RAPIDITY.

PRICE LIST.

No.	1.	Size of Plate,	4 x 5	Diameter	$1\frac{1}{16}$	Back Focus,	$4\frac{3}{4}$	Price,	$15.00
"	2.	" "	5 x 7	"	$1\frac{3}{8}$	" "	$7\frac{1}{2}$	"	20.00
"	3.	" "	5 x 8	"	$1\frac{1}{2}$	" "	$8\frac{1}{4}$	"	25.00
"	4.	" "	$6\frac{1}{2}$ x $8\frac{1}{2}$	"	$1\frac{11}{16}$	" "	$9\frac{3}{4}$	"	30.00
"	5.	" "	8 x 10	"	$2\frac{1}{8}$	" "	14	"	40.00
"	6.	" "	10 x 12	"	$2\frac{3}{8}$	" "	$15\frac{1}{2}$	"	50.00
"	7.	" "	12 x 15	"	$2\frac{3}{4}$	" "	18	"	60.00
"	8.	" "	16 x 20	"	$2\frac{3}{16}$	" "	22	"	75.00
"	9.	" "	18 x 22	"	$3\frac{3}{4}$	" "	28	"	140.00

We will send them on FIVE DAYS' TRIAL to responsible parties

Hyatt's Stamp Portrait Camera.



We are prepared to furnish our Pat. Stamp outfits to the trade. No enterprising photographer should be without one; it will increase your business, advertise you, and help you financially.

PRICES, WITH RIGHT FOR USING SAME.

Stamp Size, with 25 lens, for making 25 on 5 x 7 plate	$50.00
Minette " " 8 " " 8 on 5 x 8 "	40.00
Stamp " " 16 " " 16 on 4 x 5 "	25.00
Minette, " " 4 " " 4 on 4 x 5 "	25.00
Combination Stamp and Minette for making 16 Stamps, or 4 Minettes on 4 x 5 plate	40.00
Perforators for perforating same, under our stamp patent issued July 12, 1887	35.00

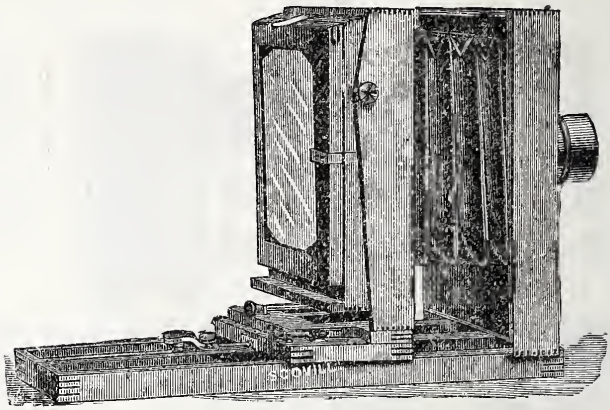
Stamp Photos furnished for the trade. Samples and full particulars sent on application.

Our complete Illustrated Catalogue No. 13 is now ready for distribution; it contains 308 pages, over 800 illustrations and 31 half-tone engravings. It is, we believe, the most complete Photographic Catalogue ever issued, and it will be mailed to any address on receipt of application and 10 cents to pay postage.

H. A. HYATT,
N. E COR. 8TH AND LOCUST STS., ST. LOUIS, MO.

PHOTOGRAPHIC SUPPLIES OF EVERY DESCRIPTION.

"PEERLESS" PORTRAIT CAMERAS.



These Cameras are made of seasoned mahogany, well polished. Above 10 x 12 size they have the Telescopic Extension Platform, Double Swing Back, and are classed among the finest instruments that are made at our New Haven Factory.

These Cameras are either fitted with Bonanza Holder with Dry-Plate Rail in addition to the Wet-Plate Trough, or they are fitted with plain Rabbeted Holder.

The Price List is as follows:

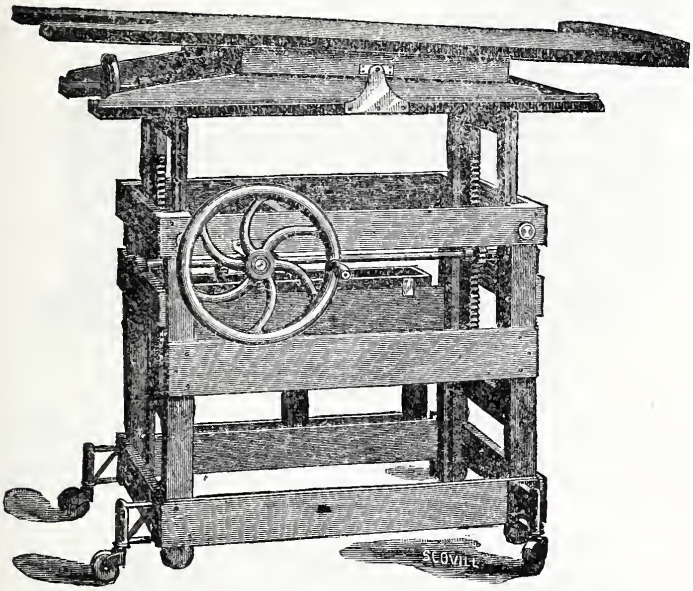
SIZE.	PRICE.
8 x 10, with Plain Platform	$30 00
10 x 12, " " "	42 00
11 x 14, " Extension Platform	60 00
14 x 17, " " "	70 00
17 x 20, " " "	84 00
18 x 22, " " "	90 00
20 x 24, " " "	100 00

THE SCOVILL & ADAMS CO., Manufacturers.

THE

"ELITE" STUDIO STAND.

(PRIZE WINNER.)



Patented.

These are the only Stands suited in workmanship and finish, also in size, to the large American Optical Co.'s Cameras, with their great length of bellows and extension platform. Practical portraitists cannot fail to admire the ease with which these stands can be adjusted at any desirable height or inclination, and the noiseless manner in which they may be moved from place to place, their elegant appearance and accurate construction.

Instead of the clumsy levers and racks, by which accurate adjustment of the platform was obtained in the older stands; the proper elevation and inclination are produced in the "Elite" stand by cog-wheel and snake screw, and the manipulation at one side by a wheel with handle, and within reach of the operator, so that he may adjust the height or inclination of this camera without taking his head from under the focusing cloth. By means of the wheel worked at the rear end of the platform, the horizontal position of the platform may be inclined upward or downward to a limit of 15 degrees. A great advantage from this movement, we observe, is that a true horizontal position—so difficult to obtain in the old camera stands—is, with these, an easy matter to effect. This is especially important to those who may use them for reproduction work. In the No. 2 size the platform is fifty-two inches long and twenty-five inches wide, and its length may be increased to seventy inches by an attachment which slides out forward, making it quite long enough for supporting a large copying camera. Then a semi-circular cut-out, to the rear end of the platform, is a convenience to the operator, who is thus enabled not only to stand closely up to the ground glass, no matter how far the camera may have been pushed forward, but bending of the body is obviated, which is quite a necessity with all the older stands.

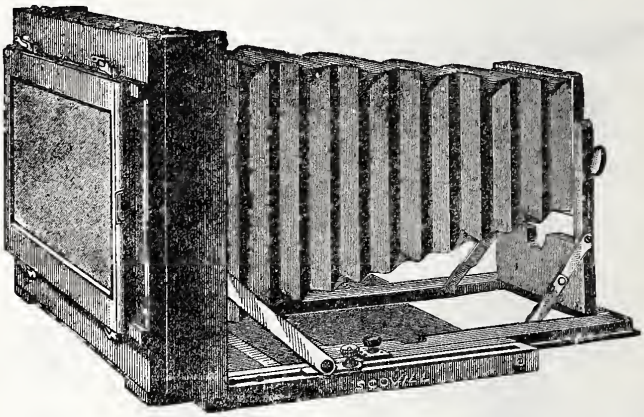
"ELITE" STUDIO STANDS

	No. 1 Size.	No. 2 Size
PRICE, with Rack and extension for Plate Holder	$32.00	$36.00
Highest point from platform to floor	48	48
Lowest " " " "	32	32
Width of platform	22	26
Length of platform without attachment	45	52
" " with "	60	70

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

IRVING VIEW CAMERAS.

The IRVING Camera recently introduced by the American Optical Co. was awarded the highest prize by the judges at the American Institute Fair. They expressed themselves as unable to see how a more complete, compact, light, handsome and serviceable camera could be made.



The Irving Cameras all have swing front in addition to swing back, vertical shifting front board. They have the Howe patent reversible back, fitted with self-locking ground-glass frame, and when desired, celluloid is used in place of glass for the focusing screen.

One of the best features of the camera is the absence of detachable screws. An idea of this is conveyed by the illustrations showing the camera when extended and when folded.

A superb canvas case, the finest ever made, is supplied with each one of the Irving Cameras. Price list is as follows:

	Single Swing.	Double Swing.		Single Swing.	Double Swing.
4 x 5	$27.00	$32.00	10 x 12	60.00	$65.00
5 x 7	33.00	38.00	11 x 14	65.00	70.00
5 x 8	35.00	40.00	14 x 17	75.00	80.00
6½ x 8½	40.00	45.00	17 x 20	85.00	90.00
8 x 10	45 00	50.00	18 x 22	95.00	100.00

In order to convey an idea of the lightness of these cameras, it is sufficient to say that the 5 x 8 size camera weighs only 3 lbs.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

The Scovill Adjustable Tripod.

(FEATHER WEIGHT.)

Nothing more compact, certainly nothing as graceful in appearance and light in weight as the new Tripod for out-door Photography, just produced by the American Optical Company, has yet made its appearance. Because so readily adjusted to the utmost irregularity of the earth's surface, it was decided to call it the "Adjustable Tripod." Lady amateurs prefer it to any other pattern on account of its lightness and beauty. The top is covered with billiard-cloth to prevent marring the fine polish on our cameras, and the clamping screws are not detachable.

SCOVILL ADJUSTABLE TRIPOD.

No. 1..... Price, each, $3.50
" 2..... " " 5.00

Scovill Adjustable Jointed Tripod, to fold and pack in a 22-inch Valise..... $4.00
Do. with Canvas Bag and Handle.. 4.75

THE IMPROVED TAYLOR TRIPOD.

The illustration here presented makes an extended description unnecessary. Suffice it to say that this tripod is very firm when set up, and folds up compactly by simply pressing together the two upper joints of each leg, thus unsetting them from the pins on the brass top and then doubling them over on to the third joint. This movement is naturally reversed when placing the tripod in position to support the camera.

Price, with metal disc and non-detachable screw.....$2.25 each.

Adapted for cameras from 1-4 to 8x10 size.

"STOP"

right where you are! Do not turn another leaf until you have read every word on this page. We feel a delicacy in publishing the following, lest it may hurt someone's feelings, but we must consult our own interests and publish the facts "verbatim" as they come to us. We do not, as a rule, favor publishing testimonials, as we are not in the "patent medicine" business, but the following being so overwhelming and wholly unsolicited we feel that we are at liberty to publish it. So here you have it:

THE OBRIG CAMERA COMPANY, 119 Broadway, City.

Gentlemen:—Having had some trouble with Aristotype paper, we wished to select the best commercial paper that we could find. For this purpose I purchased a package of each of seven kinds of paper, namely:

Solio, Perfecto, Paragon, Aristo, Omega, B. & P., N. Y.

As we wish to select the paper for photographing in our manufactory, as well as for other purposes, we wish one that could be developed with a simple bath. Prints were made of each of these papers in the ordinary manner and toned in a plain bi-carbonate of soda bath. Of these papers the Perfecto was decidedly the best paper of all that we tried. It was pleasing in printing, pleasing in toning, pleasing in every operation that was performed, and will be adopted by us, and continued as long as the quality continues what it is.

It may interest you to know that next to this paper, in convenience and results, was the Solio paper made by Eastman. Please send us 4 dozen 5 x 7, 2 dozen 6½ x 8½, one dozen 8 x 10 Perfecto paper. We shall be pleased to have this as soon as you are able to obtain it.

Yours truly,

C. W. HUNT COMPANY,

C. W. HUNT, President.

I enclose a print on "Perfecto" paper.

THE LOUCKS ARISTOTYPE COMPANY, Jamestown, N. Y.

Gentlemen:—I recently purchased the various papers in the market, the most of them from the Obrig Camera Company, in order to see which was the most available for our use. I enclose you a letter press copy of my letter to the Obrig Camera Company, stating the results of that experiment, thinking that you might be interested to know.

Yours truly,

C. W. HUNT COMPANY,

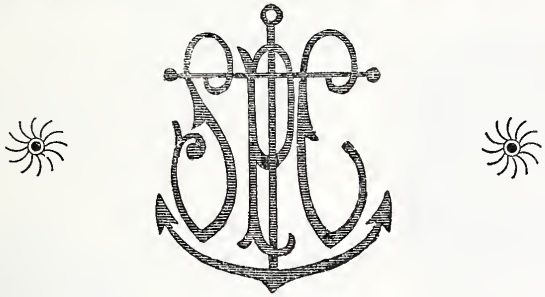
C. W. HUNT, President.

P.S.—The above C. W. HUNT Co. is one of the largest firms in their line in the country, and what they have to say may be relied upon.

PRICE LIST

OF

Leading * Developers.



EIKOQUINOLE (one 8 ounce bottle), - - - - - 35c
PARAMIDOPHENOL " " " " - - - - - 50c
HYDROCHINON (two " " " per package, - - 60c
PYRO AND SODA " " " " " - - 60c
PYRO AND POTASH " " " " " - - 60c
EIKONOGEN three " " " " - - 75c
BROMIDE, 1 quart bot. Oxalate Potass. and 1 pint bot. Iron, per set, 75c
DRY HYDROCHINON, 12 sets powders, - - - per box, 50c

HARVARD.

One 8 Ounce Bottle, - - - - - - - - - - 30c

BUCK'S.

Per box, 12 sets Capsules, - - - , - - - - - 60c

CARBUTT'S.

PYRO AND SODA (two 8 ounce bottles), per package, - - 60c
HYDROCHINON " " " " " - - 60c
EIKO CUM HYDRO " " " " " - - 60c

ANDERSON'S.

RODINAL (1/10 litre bottle), - - - - - - - - 65c

Chemicals for Developing.

SCHERING'S PYROGALLIC ACID (Genuine).

One lb. can.	Half lb. can.	Quarter lb. can.	Oz. glass.	Oz. can.
$4.67 each.	$2.40 each.	$1.25 each.	40c each.	35c each.

EIKONOGEN.

$3.95 each.	$2.10 each.	$1.20 each.	....	37c each.

HYDROCHINON.

$5.27 each.	$2.80 each.	$1.47 each.	38c each.	....

PARAMIDOPHENOL.

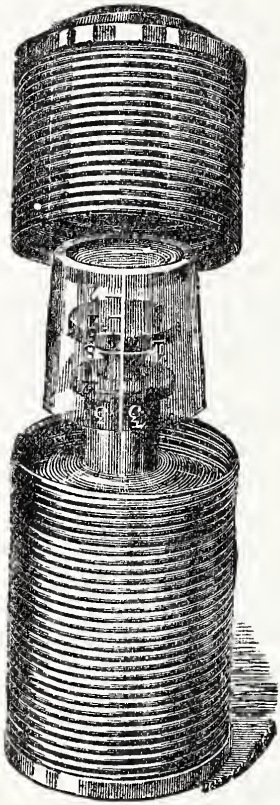
Half ounce bottle, - - - - - - - - - - - 65c

PELLETONE (Pyro-acid Tablets), one bottle containing 100 tablets of 2 grains each, - - - - - - - - 40c

Developers and Chemicals in Solution

MAY BE TRANSPORTED SAFELY IN

CORRUGATED PROTECTING CASES,



Supplied with Cut Glass Bottles, and Graduated Tumbler to Measure Liquids.

Corrugated Protecting Cases are a great convenience to the landscape photographer and amateur picture-taker when away from home. Though made of thin metal, the corrugation makes them so strong as to resist crushing. Being nickeled and finely finished, the external appearance of these Cases is

Decidedly Tasteful,

indeed, one would be more inclined to place them in a satchel than in a packing case. Whether carried about in a horizontal or vertical position, the locking ring affords perfect protection for the liquids contained in the bottle.

PRICE LIST.

No. 1.—Diameter, 1⅝ in. Length, 3½ in. Weight, 4½ oz. Furnished with 1 ounce bottle.....$ .50

No. 3 A.—Diameter, 2 in. Length, 5½ in. Weight, 7¾ oz. Furnished with 4 oz. bottle, with tumbler, making ¼ pint flask ..... .85

No. 4 A.—Diameter, 2½ in. Length, 7 in. Weight, 14 oz. Furnished with 8 oz. bottle, with tumbler, making ½ pint flask 1.10

No. 13 A.—Diameter, 2⅞. Length, 6 in. Weight, 17 oz. Furnished with 8 oz. bottle, with tumbler, making ½ pint flask 1.20

ANDERSON'S
Photo-Engraving Compound.

THE only **sensitizing material** on the market to-day giving high class Half-Tone Engravings on Copper. Sensitive as Albumen; requires "**one minute exposure,**" "**no inking up**"; "**etched without acid**" and "**every plate a success.**"

Will stand ONE HUNDRED THOUSAND impressions, and the Last equal to the First.

The desirability of ALL acquiring a remunerative and congenial profession in going through life is as requisite "**As helm to ship in storm-tossed sea.**"

ANDERSON'S
"SENSITIVE ENAMEL"

Will at once put the key into your hand, and give you entrance to the "**Inner Chamber of Photo-Engraving in Half-Tone.**"

SAMPLE AND INSTRUCTIONS, $5.00.

Special Rates to Customers.

Three years head of the Photo Mechanical Department, Mount Street Works, Nottingham, England.

Author of "PHOTO-MECHANICAL PROCESSES," a manual containing practical working instructions on all processes up to date. Price, **$5.00.** Will be issued June, '94.

Establishments opened and put in working order.

All orders for the Manual or "Sensitive Enamel" addressed to

MACFARLANE ANDERSON,

NORTHPORT,

Stevens County, Washington, U.S.A.

The Albertype Co.,

Photo-Gelatine Printers,

67 & 69 Spring Street,

New York.

THE largest and most complete establishment in the country for the production of the highest classes of work by the following processes.

PHOTOGRAVURE.

The best process for the most artistic results, equal to steel engraving, and to any similar work in the world.

Capacity—Plates and Editions up to 24 x 30.

PHOTO-GELATINE.

(Albertype.) The best process for all delicate photographic and scientific work, reproductions of large photographs, and catalogue and souvenir work in short editions, portraits, views, etc.

Capacity—Hand press and Steam press work up to 24 x 30.

PHOTOTYPE.

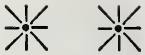
(Half-tone relief plates for printing on type presses.) The best for souvenirs of towns and catalogue work, costing half the ordinary price.

Capacity—Plates and Editions.

We will supply the plates, but prefer to deliver the editions complete, as better work is thereby insured.

SEND FOR ESTIMATES.

Max Levy's



PERFECTED ENGRAVED GRATINGS

FOR THE

Half-Tone Process

PATENTED U. S. AND ENGLAND, FEB. 21ST, 1893.

These Screens are all original rulings, and are now used by all the leading firms in America and England, and many of those in Germany and throughout the world.

They are adapted to all methods,

RELIEF,
INTAGLIO or
PHOTO=LITH.

These Screens possess every quality necessary in a perfect appliance for the work for which they are made, and are universally conceded to be the most perfect ever produced, and to yield results which possess a delicacy of modeling and detail hitherto unapproached.

Plates can be supplied in any size, from 4 x 5 up to 32 x 38 inches, and any ruling from 50 to 300 lines per inch.

The results of the leading establishments of this country are almost without exception examples of work produced with these screens.

I sell trial sizes as follows :

4 x 5 inches	$5.00
5 x 7 "	12.00
5 x 8 "	15.00

These sizes are ruled either 120 or 133 lines per inch diagonal to sides of plate and crossed.

Illustrated Price List will be sent on application.

MAX LEVY,

PATENTEE AND SOLE MANUFACTURER,

1213 Race Street,

Philadelphia, Penn., U. S. A.

PHOTO-ENGRAVING OF ALL DESCRIPTIONS.

Half Tone Work on Copper and Brass.

Half Tone Color Work a Specialty.

PHOTO-CHROME ENGRAVING CO.,

162–166 LEONARD STREET,

NEW YORK.

Amateur

Photographers

WHO USE

Blue Print Paper

are requested to send for our descriptive pamphlet, containing full printing directions and a complete price list of

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The New Blue Print Paper.

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PHILADELPHIA BLUE PRINT CO.,
41 N. 7th St., Philadelphia, Pa.

SUN & SHADE

APPEALS to *all lovers of art.* The numbers already issued contain reproductions of the most notable paintings, the most notable people, the most notable work of amateur and professional photographers, and form the most notable record either for a permanent place in the household or for artistic decoration. The work is all printed by hand, on the very best heavy etching paper, by the very best processes of the N. Y. PHOTOGRAVURE COMPANY, which combine the accuracy of the photograph with the delicacy and strength of the steel engraving, and the added beauty that the work of the best artists can give in finishing the plates, and in which the N. Y. PHOTOGRAVURE COMPANY stands easily at the head. Each issue consists of eight or more plates, on paper, 11 x 14 inches.

TERMS, $4.00 PER ANNUM.
SINGLE OR SAMPLE COPIES, 40 CENTS EACH.

About one-quarter of the price usually paid for subscription works of inferior quality.

"Plates of the highest merit both in design and execution."—
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THE PHOTOGRAPHIC TIMES.

First.—Because it is acknowledged to be the leading organ of photography in America.

Second.—Because it has the largest circulation among the best class of readers.

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Fourth.—Because it is the only photographic weekly journal in the world which is illustrated every issue with a high-grade photographic picture.

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Seventh.—Because you reach a class of buyers in it, not obtained through any other medium.

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Ninth.—Because it contains every week more original information prepared especially for its columns than any other photographic magazine.

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Twelfth.—Because its pages are double the ordinary quarto size.

Thirteenth.—Because its rates are lower than any photographic publication, considering the size of page and the extent of circulation.

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Fifteenth.—Because all its advertisers are endorsed by the publishers as being worthy of patronage.

Sixteenth.—Because no advertisement in any way objectionable is admitted to its pages.

Seventeenth.—Because all the leading manufacturers of and dealers in photographic goods are represented in its advertising pages.

Eighteenth.—Because its advertisers receive more returns from ads. in it, than in any other photographic publication. (An unsolicited testimonial from a leading photographic dealer.)

Nineteenth.—Because it is not an experiment, having reached its 22d year.

Twentieth.—Because, in short, it will pay you to advertise in it.

THE

Chautauqua School of Photography.

MOTTO: "AND THERE WAS LIGHT."

LOUIS MILLER, President. JOHN H. VINCENT, Chancellor.

MISS K. F. KIMBALL, Buffalo, N. Y., Secretary C. S. P.

This School instructs in the Theory and Practice of the Art-Science of Photography, at the CHAUTAUQUA ASSEMBLY GROUNDS, in Summer; the local classes at the School's Headquarters, 423 Broome Street, New York City, during the Autumn, Winter and Spring, and by the corresponding classes through Printed Lessons and the Organ of the School.

I.—The Corresponding Class, Headquarters 423 Broome Street, New York, open for admission at any time, receives instructions by twenty-four printed lessons, prescribed home practice, required reading and by correspondence with the instructor.

Course of Instruction one year, tuition fee, inclusive of books, ... $7 00

II.—The Practising Class opens on July 1st, every year, and remains in session until about September 15th. Practice in studio and field. Theoretical instruction and lectures on photographic subjects.

Course of ten lessons, ... $5 00
Special lessons, each, ... 1 00
Independent of photographic materials and the text book.

III.—The New York Classes begin November 15th and end about May 15th. The skylight room and laboratory used by these classes are on the seventh floor of No. 423 Broome Street, New York. (Take elevator.) Separate classes for ladies.

Cost of course of ten lessons, including entrance fee, text-book and materials used in demonstration, ... $7 50
Special single lessons, per hour, each, ... 1 00
Cost of ten lessons in Portraiture, or special subjects, ... 10 00

IV.—The Post-Graduate Class course of instruction two years. Subjects: Chemistry, Photo-Chemical Processes, Optics, and Esthetics by required reading and correspondence with the Instructor.

Tuition fee, including one year's subscription to *The Photographic Times* but independent of text-books, ... $10 00

After completing a regular course the student is admitted to examination and, if passed, is awarded a Chautauqua Diploma.

The weekly *Photographic Times*, illustrated, is the official journal of the school. Students residing in foreign countries will be charged $1 extra for postage.

In accomplishments and numbers the Chautauqua School of Photography stands unrivaled. Her fame has reached beyond our own shores, for among the students of the Corresponding Class are many residents of Canada, the West Indies, Mexico, South America, Europe, India, China, Japan and South Africa,

The Chautauqua Exchange Club, an institution of the School, has proved to be a very useful and instructive adjunct to the regular instruction.

For particulars, address

Prof. CHAS. EHRMANN,
INSTRUCTOR C. S. P.,
423 Broome Street, New York.

N. Y. PHOTOGRAVURE CO.

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HAVE LATEST IMPROVEMENTS
ARE FULL NICKEL FINISH
GUARANTEED IN EVERY PARTICULAR
HAVE KNURLED ROLL.

1893 Roll Heater IS FINEST BURNISHER IN THE WORLD.

ONE HAND-WHEEL ADJUSTMENT.

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ACME BURNISHERS have Thermometer attached, hence spoiled Prints are an impossibility.

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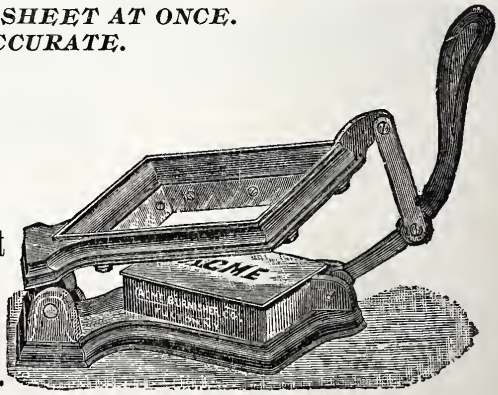

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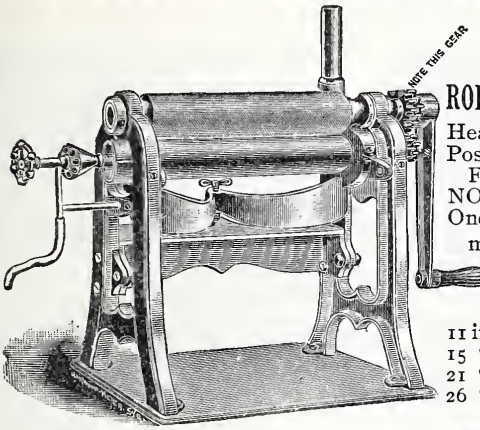

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ACME ROTARY

ROLL HEATING BURNISHER.

Heats in FIVE MINUTES.
Positively no moisture on Feed or Burnishing Roll.
NOTE THE GEARS.
One Hand-Wheel Adjustment.

PRICE.

11 in.	Gasoline	or	Gas,	$25.00
15 "	"		"	35.00
21 "	"		"	50.00
26 "	"		"	60.00

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IMPROVED ROTARY BURNISHER.

PRICE.

8 inch Rotary—Alcohol, Oil or Gas	$13.00
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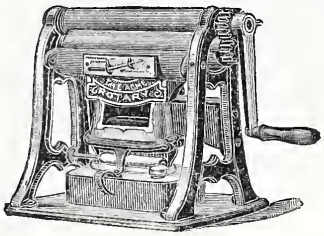
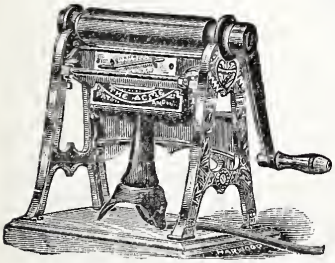


PATENTED '90-'91.



PATENTED 76, '86, '88, '90.

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STATIONARY BURNISHER.

PRICE.

8 inch Stationary—Alcohol, Oil or Gas	$10.00
11 inch Stationary—Alcohol, Oil or Gas	18.00
15 inch Stationary—Alcohol, Oil or Gas	22.00
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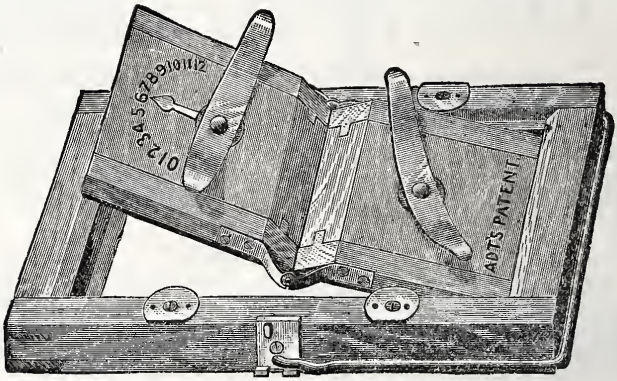
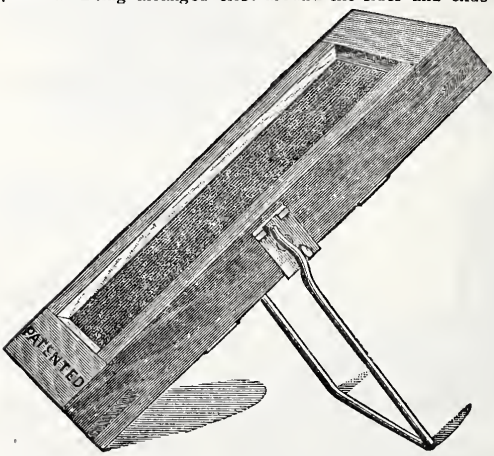
FULTON, N. Y.

ADT'S PATENT PRINTING FRAMES.



These Frames are now supplied (without extra charge) with Adt's Patent Support with which the frame can be stood on either end, and at four different angles, for exposure while printing. It is out of the way of the printer when introducing the paper, or examining the print, for when the frame lies or is held with back up, the support instantly drops upon its stops for rest, and is entirely out of the way of the hand of the printer, so that he may remove or open the back-board, or replace it, as if there were no support present. Being arranged close around the sides and ends of the frame, it occupies so little space as not to interfere with the packing or storage of the frames, and when the printer places his frame for exposure the support readily finds its position for supporting the frame without any special manipulation.



PRICES.

3¼ x 4¼	$0 50
4 x 5	50
4¼ x 5½	50
4¾ x 6½	60
5 x 7	65
5 x 8	65
6½ x 8½	75
8 x 10	85
10 x 12	1 15
11 x 14	2 15
13 x 16	2 40
14 x 17	2 80

When made with back to open lengthways, an additional charge of 10 per cent. will be added to the above prices.

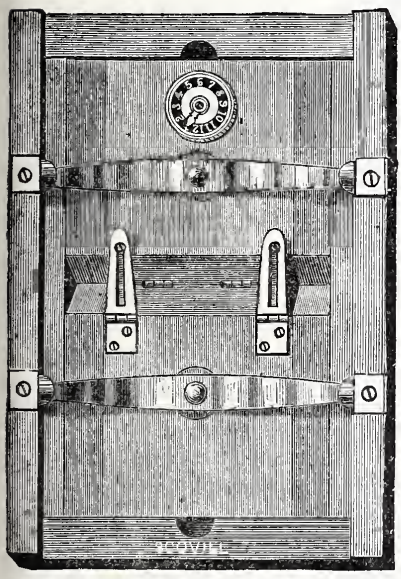
As will be seen by a glance at the cut, the adjacent edges of the parts of the back-board are beveled outward, and the hinges placed on the sides with their axes on a line with the surface. This permits the attachment to the face of the back-board of a **Heavy, Continuous Elastic Felt Pad.** This obviates the necessity of using a separate pad, which is so easily misplaced and lost.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

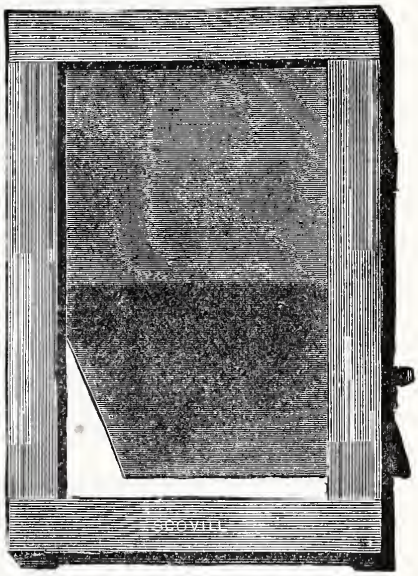
IRVING PRINTING FRAMES

WITH ADJUSTABLE SUPPORTS.

(PATENTED.)



IRVING PRINTING FRAME, CLOSED
FRONT VIEW.



IRVING PRINTING FRAME, OPEN.
BACK VIEW.

The IRVING FRAMES have valuable features which cannot be copied. They are in workmanship, design, and other respects, superior to all other printing frames.

The continuous felt pads made especially to order for us, insure absolute protection and uniform pressure throughout. The Irving Patent Catches lock the back, so that when one flap is open there is not the slightest danger of the flaps, paper or negative slipping.

The springs are cut by dies of specially tempered and tested metal, and are riveted to the backs with washers underneath to protect the woodwork.

The IRVING FRAMES are made of cherry guaranteed not to warp or crack.

The tally does not depend upon any other part of the frame to lock it, for the pointer will remain in place no matter what is done to other parts of the frame.

Prices for Half or Two-thirds Opening Styles.

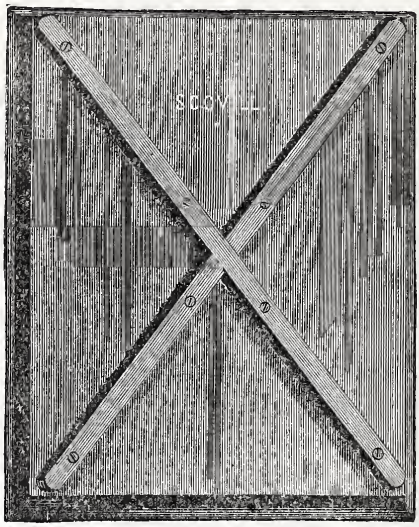
3¼ x 4¼	$ .45	5 x 7	$ .60
4 x 5	.48	5 x 8	.65
4¼ x 5½	.50	6½ x 8½	.70
4¼ x 6½	.55	8 x 10	.80

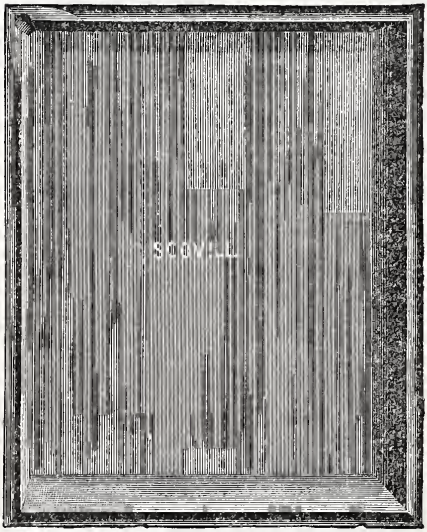
When made with backs to open lengthways, ten per cent. is added to the foregoing prices, for the respective sizes.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

FOR SILVERING,

THE WATERBURY TRAYS ARE THE BEST AND CHEAPEST.





These Trays are made by the

AMERICAN OPTICAL CO.

which of itself is a guarantee of the superiority of the wood-work.

Canvas is not required for the seams, as the bottoms are seamless. The bottom rests on cross-strips—a great improvement, for steadiness, over knobs at the corners, which were liable to be broken off.

THE

Waterbury Trays

are guaranteed not to warp or crack.

PRICE LIST.

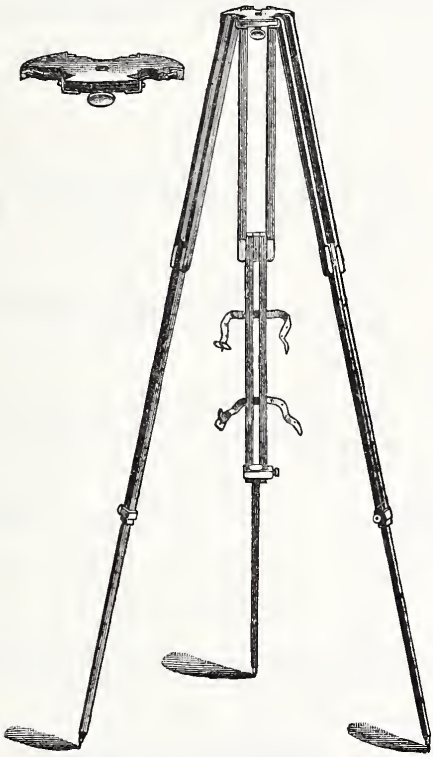
	Each.
15x19 Waterbury Trays.....	$3 50
19x24 " "	5 00
22x28 " "	6 50
25x30 " "	9 00

For Sale by all Dealers in Photographic Requisites, and by

THE SCOVILL & ADAMS COMPANY.

THE ALBION TRIPOD.

This is the most elegant Tripod ever introduced. It is adapted to and is firm enough to support without vibration any View Camera from 5 x 7 to 10 x 12 size, inclusive.



The Legs of this Tripod are adjustable as to length, and may be quickly folded. As the binding straps are attached, they are always in place when wanted.

The artistic design and faultless finish of every portion of this Tripod cannot be realized without seeing one, and to use an ALBION TRIPOD means to be fully satisfied, and wish for none other.

No. 1, Cherry wood..... $4 50
No. 2, " " 6 00
No. 3, Spruce (very light), price..... 6 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

Arthur Schwarz,

New York, 3 East 14th Street,

SOLE IMPORTER OF

: Eikonogen

: Rodinal

: Amidol

"The Big 3."

PATENTED AND MANUFACTURED BY

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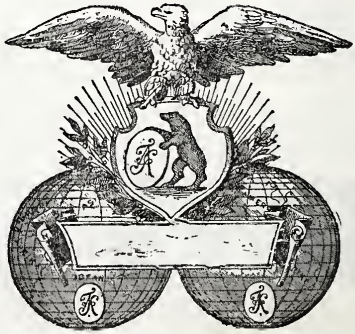
None genuine



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FOR SALE BY ALL DEALERS.

Arthur Schwarz,

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SOLE IMPORTER OF

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Cartridges.

Amidol . . . . . .

Cartridges.

Ton-Fixing . . . .

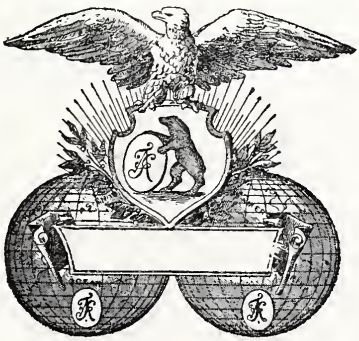
Cartridges.

A new preparation, giving a combined toning-fixing bath.

Can be used for all kinds of albumen emulsion paper.

Most handy and economical.

None genuine



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FOR SALE BY ALL DEALERS.

Arthur Schwarz & Co.

DASHWOOD HOUSE,
9 NEW BROAD STREET,
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SOLE AGENTS FOR

DR. ANDRESEN'S

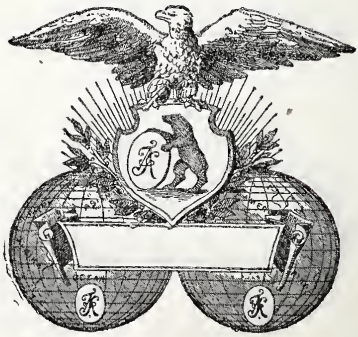
EIKONOGEN
RODINAL
AMIDOL
METOL
GLYCIN

Developer and Cartridges.

DR. ANDRESEN'S

TON-FIXING CARTRIDGES.
FIXING CARTRIDGES.
SULPHITE OF SODA.
CARBONATE OF SODA, Etc.

None genuine



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FOR SALE BY ALL DEALERS.

HARD RUBBER PLATES.

For Squeegeeing Prints Upon.

			$\frac{1}{16}$ in. thick.				$\frac{1}{16}$ in. thick.
4	x	5	.....10 cents each.	8	x	10	.....40 cents each
5	x	7	.....18 "	10	x	12	.....60 "
5	x	8	.....20 "	11	x	14	.....75 "
6½	x	8½	.....30 "				

SQUEEGEES.

6 inches, each	.....	$0 40
8 " "	.....	50
12 " "	.....	75

—S. P. C.—

JAPANNED DEVELOPING TRAYS

(Made of Selected Metal)

—FOR—

DRY PLATE PHOTOGRAPHY.

Size 4½ x 5½ inches	.....price each,	20	cents.
" 5½ x 8½ "	..... "	25	"
" 7 x 9 "	..... "	30	"
" 8½ x 10½ "	..... "	40	"

IMPROVED PAPIER MACHE TRAYS,

THE COATING OF WHICH IS SUPERIOR TO ANY GOODS OF THIS CLASS YET PUT UPON THE MARKET.

PRICE LIST PAPIER MACHE TRAYS.

No. 1,	for	3¼	x 4¼	plates,	each	.....	$0 25
" 2,	"	4	x 5	"	"	.....	30
" 3,	"	5	x 7	"	"	.....	50
" 4,	"	5	x 8	"	"	.....	50
" 5,	"	7	x 9	"	"	.....	75
" 6,	"	8	x10	"	"	.....	1 00
" 7,	"	10	x12	"	"	.....	1 50
" 8,	"	12	x14	"	"	.....	2 00
" 9,	"	14	x18	"	"	.....	2 75
" 10,	"	16	x20	"	"	.....	3 25
" 11,	"	19	x24	"	"	.....	5 50
" 12,	"	23	x27	"	"	.....	6 50
" 13,	"	26	x30	"	"	.....	7 50
" 14,	"	28	x34	"	"	.....	8 50

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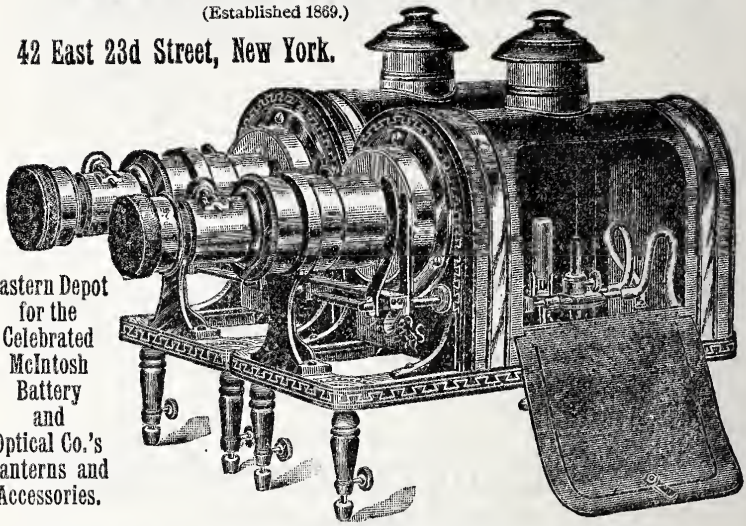
OELSCHLAEGER BROS.

(Established 1869.)

42 East 23d Street, New York.



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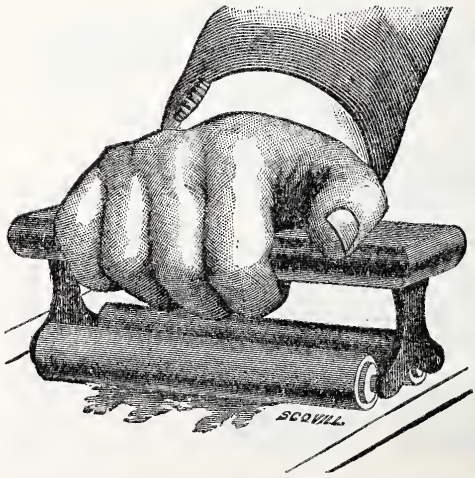
IMPORTERS AND MANUFACTURERS OF

STEREOPTICONS AND FINE MAGIC-LANTERNS, LANTERN-SLIDES AND ACCESSORIES.

PHOTOGRAPHIC LENSES, CONDENSING LENSES AND OBJECTIVES A SPECIALTY.

The Columbia Print Roller.

PRICE, $1.00.



A good and handy Print Mounter. Its construction is such that more or less pressure can be brought to bear upon the print, to remove air cells and inequalities, and leave a smooth surface. The rollers are six inches long.

Try one and be convinced of its merits.

THE SCOVILL & ADAMS CO.

— THE —

AMERICAN OPTICAL COMPANY'S

APPARATUS,

Either for Studio use or for Out-door Photography,

HAS NEVER BEEN EXCELLED OR EVEN EQUALLED

In Variety of Design, Durability of Construction, and in Fineness of Finish.

The Boston Imperial Camera is now the most popular of the numerous styles of Studio Cameras.

Of the View Cameras, the Irving and Star Reversible Back-View Cameras and the Revolving Back-View Cameras are the most popular.

In Hand Cameras and Amateur Outfits, the styles are so numerous that the latest catalogue must be consulted to get a fair idea of them.

The American Optical Company's Apparatus

Is sold by all the leading photographic merchants in this country, Canada, West Indies, South America, Australia, Great Britain, Russia, Mexico, and in many other parts of the globe. Consult the latest descriptive catalogue; it is sent without charge by

THE SCOVILL & ADAMS COMPANY,

423 Broome Street, New York.

"Your apparatus is, in my opinion, the best made."

C. D. ARNOLD,
Official Photographer.

It's only a Straw but—

Our Photographic Apparatus is used exclusively by the two Official World's Fair Photographers.

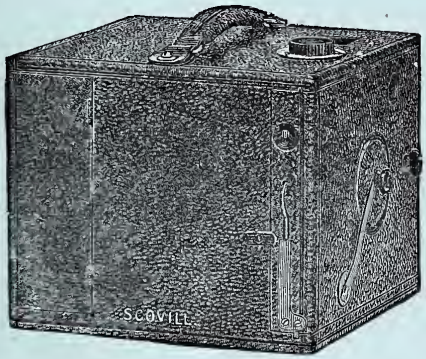
Scovill & Adams Co.,

423 Broome Street, New York.

"With the best Outfit in the World (The Scovill) I find photographing line one continual pleasure."

B. W. KILBURN,
World's Fair Stereoscopic Photographer.

THE WATERBURY DETECTIVE CAMERAS.



MANUFACTURED BY THE AMERICAN OPTICAL COMPANY.

Timed and Instantaneous Photographs. This is the only Detective Camera which is as well adapted for making timed views as for photographing quickly moving objects. The negatives produced are of such sharpness that they may be enlarged to almost any size. It is

The only Detective Camera made with plate for tripod, and with ground-glass the full size of the plate, just as in an ordinary view camera. This ground-glass is where it cannot easily be broken.

The Recessed Finder shows *the same image* as is included on the ground-glass, though diminished in size. Without this accurate finder, one cannot be sure of what is taken in or left out of an instantaneous photograph.

The Focusing Scale is beside the Finder, where it may be readily seen and adjusted.

PRICE LIST.

	Leather Covered.
4 x 5 Waterbury Detective Camera, with 2 Double Holders.....	$25 00
5 x 7 " " " " 2 "	40 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

BOOK CAMERA.

In introducing our New Book Camera, we present a photographic instrument which we think will be appreciated by the ladies as well as by the opposite sex. Our chief aim has been to manufacture a camera that is compact and light, and, at the same time, not have the appearance of the ordinary square hand-camera which is now almost universally recognized and avoided. This has been accomplished, after careful study, and we take great pleasure in recommending our new Folding

BOOK CAMERA.

The general appearance of this new camera is of three leather-covered books encircled by a strap. Attached to this strap is a neat handle by which to carry the camera. No lady or gentleman need have any fear that this parcel will attract attention as a camera for it certainly looks as much unlike a camera as anything can, and it is a very striking counterfeit of a parcel of three *bona-fide* books.

The lens for this ingenious instrument is a rectilinear combination, of the wide-angle variety, with interchangeable stops made expressly for this camera, and is superior to anything yet offered at its very low price.

The construction of the shutter is after the leaf pattern, and is located between the lens glasses—a feature not used in ordinary hand cameras. This gives a wider range of angle and does away with the use of a stopper for the lens.

The Outfit consists of a Camera and lens, with leaf shutter,

One 4 x 5 double Film plate holder,

One 4 x 5 single dry plate holder,

One canvas case with shoulder straps (the canvas case is only $10\frac{1}{2}$ x 6 x 7, and will accommodate five extra plate holders).

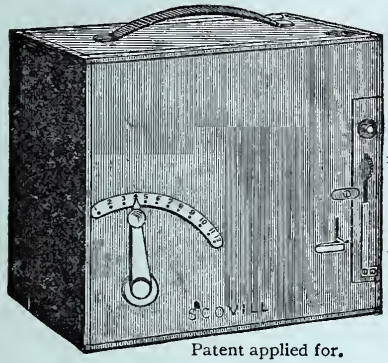
Price of Outfit, complete, - $25.00.

ADVILL CAMERAS

FOR CUT FILMS.

DIRECTIONS. { *SET THE SHUTTER.*
TOUCH THE RELEASE.
MOVE THE INDICATOR.

There are many amateur photographers who do not want to be encumbered with glass plates, nor do they want to use films in rolls, as in many roll holders one hundred exposures must be made before any portion of the roll can be developed, and the finished pictures conveniently made. Our



Patent applied for.

Advill Cameras

—made for either twelve or eighteen cut films—are a happy medium between these extremes. Each film carrier has a number corresponding to a similar number on the outside of the camera. After exposing one film move the indicator along from one number to the next number to get the exposed film out of the way and the unexposed film into place.

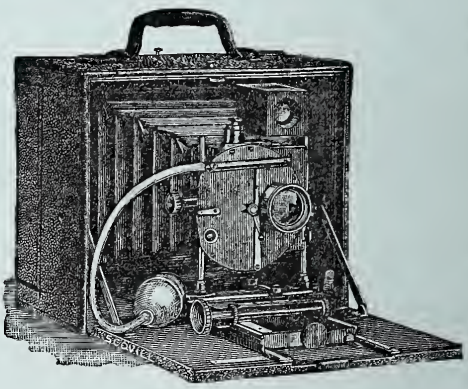
The camera is fitted with an Instantaneous Lens, which has an arrangement connected with it for changing the stops in the Lens without opening the camera. The shutter is arranged for both timed and instantaneous exposures. Attached to the leather-covered case there is a recessed finder.

	PRICE.
No. 1, for 12 4 x 5 Films, - - - -	$20 00
No. 3, for 12 4 x 5 Glass Plates, - - -	25 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

THE HENRY CLAY CAMERA.

This is the only Double-Shifting and Swing-Front Hand Camera.



The case is leather-covered, and when closed there is no finder visible, or openings elsewhere, to indicate that the Camera mechanism is concealed inside.

To open the Camera, press on the knob visible on the front, thus allowing the front to slide and then swing under the bottom of the Camera. The platform or bed of the Camera is carried with this board, and, by turning the wheel, the bed is made perfectly rigid. It will at once be apparent how the front may be racked outward until the front end of it is over the lines which indicate the focus for various distances. The figure 60 on the focusing scale indicates the focus for 60 feet or beyond. The finder of the Camera is now placed on the top of the front board, and is therefore always at the same angle as the lens; the finder is a reversible one, which may be turned when the Camera is fastened to a tripod, or is held, not with the handle upward, but with the handle on the side, in order to secure a vertical instead of a horizontal view. The front board is arranged to slide upward when taking a tall building, church spire, or any high object, and it is also arranged to swing, to still further aid in that endeavor.

By an ingenious arrangement the swing and vertical sliding adjustments may be made to work when the Camera is turned over and used horizontally.

One of the advantages of this Camera, when used in the hand, is in the taking of street scenes from an elevated position and having the lines of the building straight, while the subjects taken may be near by.

On the same principle, objects situated above the Camera level may be taken by reversing the position of lens and finder.

PRICE.

5 x 7 Henry Clay Camera complete, with Instantaneous Lens and Plain Shutter, . .	$50 00
Ditto, with Pneumatic Release, ...	55 00
Ditto, with Roll-Holder and one Double Plate or Film-Holder, ...	70 00

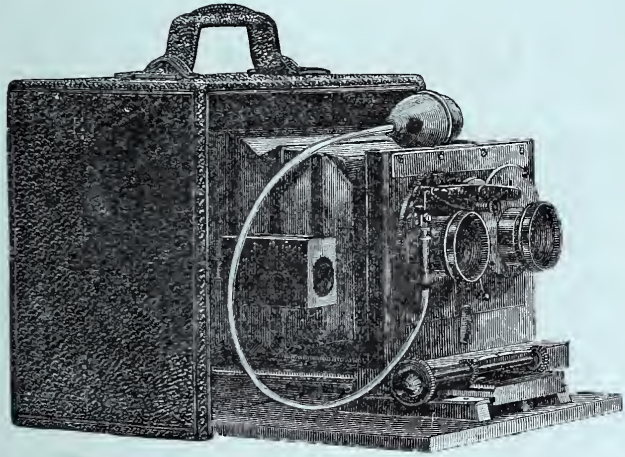
MANUFACTURED BY THE

AMERICAN OPTICAL COMPANY.

THE SCOVILL & ADAMS CO., Proprietors.

THE 5 x 7 HENRY CLAY
STEREOSCOPIC CAMERA

FOR TRIPOD AND HAND USE.



IT is commonly known that of all pictures, those which are arranged to give the stereoscopic effect when viewed in a stereoscope convey the true impression of perspective and solidity.

It seems strange, indeed, that of the myriads of instantaneous pictures made, so few are taken with reference to their future use in connection with the stereoscope, *for it is only by that means that the idea of perspective and solidity can be conveyed.* We can only assign as the reason the present almost universal use of hand cameras, and that none of them have, up to this time, been arranged for stereoscopic pictures.

There is a much over worked phrase—"the long-felt want," but we think that just that, literally, will be met by the new hand camera which the American Optical Company have just finished.

This camera measures eight inches high, nine inches long and five inches wide; its weight is about five pounds. It has a screw plate underneath, so that it may be used with a tripod. It has a door in the back of the case, and through that opening the image thrown by the lenses may be seen on the ground-glass focusing screen.

The illustration shows the appearance of the camera when open. The pair of Rapid Rectilinear Lenses is fitted with a triplex stereoscopic shutter with pneumatic release, made by the Prosch Manufacturing Company.

The camera is furnished with a focusing scale and a reversible finder. Either half of the stereo. negatives when cut in two are of a size suitable for making lantern slides from.

This camera may also be used to take a single picture of the size of the ground glass focusing screen (5x7 inches), either vertical or horizontal. In the former case the reversible finder comes into use. The septum which divides the camera inside is arranged so that it may be easily taken out; the stereo. lenses are mounted on a removable front and an extra front is furnished on which may be placed any lens of not over seven and a half inches equivalent focus.

PRICE, with a pair of Rapid Rectilinear Lenses and Prosch Stereoscopic Shutter with Pneumatic Release, - - - - - - **$75.00**

This camera can also be made with vertical sliding and swing front. By means of the former the proportion of sky and foreground may be adjusted; the latter permits the taking of subjects which may be either above or below the level of the camera and still preserve the lines vertical.

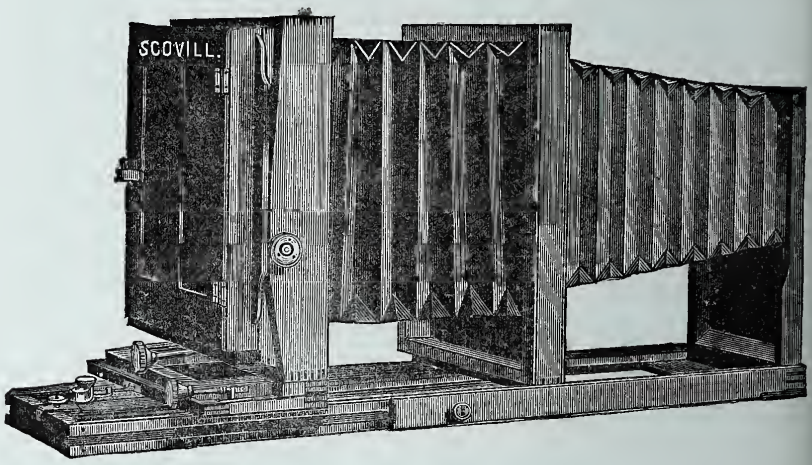
PRICE, with a pair of Rapid Rectilinear Lenses and Prosch Stereoscopic Shutter with Pneumatic Release, and with vertical sliding and swing front **$80.00**

A 5x7 Roll Holder for Transparent Films can be furnished with either of the above forms of this camera for $15.00 additional. This addition would make the case about two inches wider and one-quarter inch higher.

THE AMERICAN OPTICAL CO.'S

UNRIVALED

PORTRAIT CAMERAS.



The American Optical Company Portrait Cameras are manufactured from the best mahogany, French polished, and have the Lever Focusing Attachment, by which the most delicate focus can be adjusted with the utmost facility and ease. Above 10 x 12 size, they have double bellows, vertical shifting front, the V-shaped wooden guide, and telescopic platform.

No.	Size.						With Double Swing-back.
5—	8x10 ins.,	with rigid platform		30 ins.	long		$38 00
6—	10x12	"	"	"	36	"	48 00
7—	11x14	"	extension	"	48	" double bellows and vertical shifting front,	64 00
8—	12x15	"	"	"	48	" "	72 00
9—	14x17	"	"	"	60	" "	76 00
10—	16x20	"	"	"	65	" "	88 00
11—	17x20	"	"	"	65	" "	90 00
12—	18x22	"	"	"	70	" "	100 00
13—	20x24	"	"	"	72	" "	110 00
14—	22x27	"	"	"	72	" "	130 00
15—	25x30	"	"	"	80	" "	170 00

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Highest Prizes ever awarded for Phototypes.

THE F. GUTEKUNST CO.,

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TELEPHONE, 4670.

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PORTRAITS DIRECT FROM NEGATIVES.

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INTERIORS,
EXTERIORS,
ETC., ETC.

NOTHING MORE PERMANENT ON PAPER THAN PHOTOTYPE.

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PHILADELPHIA, U. S. A.

TELEPHONE, 4670

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It isn't costly.
Is good looking.
Well made.
Good lens.

First rate for beginners.

If you want to know more about it or anything else photographic, write us.

Scovill & Adams Co.

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The

Bristol

Magazine Camera.

For cut films.
Twenty-four to thirty-six exposures.
Standard lantern slide size.
Compact, portable, handsome, simple.
Every part accessible.

Send
for illustrated
descriptive pamphlet.

Scovill & Adams Co.

423 Broome St., N.Y.

A Book

Camera

Very deceitful, but a thoroughly practical camera. It possesses all the improvements known to the latest Boxes, but all concealed.

Ask us about it.

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The Improved

Waterbury.

A hand camera with every advantage. For plates, cut films or roll holder. A focusing adjustment, two finders, a device for adjusting speed of shutter; can be used with tripod. Light and handy.

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of our
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A B C Photo Outfits $2.

All the requirements for making a finished mounted "Blue" printed Photograph for $2. For black and white pictures $2.50. Send cash P. O. Orders or Registered letter.

Scovill & Adams Co.

423 Broome St., N.Y.

THE AMERICAN SCHOLARS' COMPLETE EQUIPMENT.

No. 1 SCHOLARS' EQUIPMENT, Consisting of

1—4¼ x 5½ Camera, fitted with
1—4¼ x 5½ Dry Plate Holder.
1—4¼ x 5½ Printing Frame.
1—Single Achromatic Lens and
1—Tripod.
1—doz. 4¼ x 5½ Gelatine Dry Plates.
2—4¼ x 5½ Japanned Trays.
1—3 oz. bottle S. P. C. Pyro and Potash Developing Solution No. 1.
1—3 oz. bottle S. P. C. Pyro and Potash Developing Solution No. 2.
1—6 oz. package of Hyposulphite of Soda.
1—package 4 x 5 S. P. C. Ready Sensitized Albumen Paper.
1—3 oz. bottle S. P. C. Toning Solution No. 1.
1—3 oz. bottle S. P. C. Toning Solution No. 2.
1—sheet of yellow Post Paper, and

Full directions for making Photographs with the above, packed securely in a neat wooden box.

No. 1.—Price, $5.00.

EXTRA HOLDERS, EACH, $0.75.

No. 2 Scholars' Equipment comprises same apparatus, materials, etc., as above, but of size suitable for 3¼ x 4¼ photographs.

No. 2.—Price, $4.50.

EXTRA HOLDERS, EACH, $0.65.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

A healthy
photographic appetite

will not be satisfied with anything short of a

Henry Clay
Camera.

THE AMERICAN PHOTOGRAPHIC PAPER CO.,

MANUFACTURERS OF

PHOTOGRAPHIC PAPER,

Plain paper in Sheets for Albumenizing, Salting, and Mat Surface work.

ALSO IN ROLLS FOR SOLAR ENLARGEMENT PRINTING, BROMIDE, ETC.

Unprepared Blue Print Paper in Rolls.

Heavy, Medium, Thin and Extra Thin Grades.
Widths 27—30—36—42 inches.

64 FEDERAL STREET, BOSTON, MASS., U. S. A.

Remember

Reifschneider's superb Albums, the "Eclipse," and Reifschneider's "Non-Cockle," can always be found at

THE SCOVILL & ADAMS COMPANY,
423 Broome Street, N. Y.

THE NEW ACME Transparent Water Colors

For Coloring Photo-Portraits or Views, Lantern Slides, Transparencies, Engravings, Etc., on any kind of paper.

KEPT BY DEALERS IN

ARTISTS' MATERIALS.

SEND FOR DESCRIPTIVE CIRCULAR.

PRICE.

Box Complete, . .	$2.50
Amateur Box, . . .	1.00
Single Colors, . .	.25
Acme Medium, . .	.25

THESE are not liquid colors, but are moist and put up in cups; the complete sets being contained in a handsome tin case, which also contains palettes and directions for use. They are easy to apply; very effective and more durable to light than any liquid colors. And as they are sold in a condensed form, greater strength can be secured than with the diluted liquid colors. They are also more economical as they neither spill, freeze nor precipitate.

Each set now contains New Rose, Scarlet, Flesh, Gold, New Violet, Deep Blue, Dark Brown, Neutral Tint, Deep Yellow, Dark Green, Blue Gray, Carmine, Blue Black, Brown Madder, Pink Madder, Chinese Opaque White, 16 colors in all, and all are transparent except the Chinese White. No difficulty in burnishing photos after coloring.

ACME WATER COLOR CO., 3450 Indiana Ave., Chicago, Ill.

The Scovill Wonder Equipments

No. 1, Price $7.50, consists of

1 4 x 5 Wonder Camera,
1 Wonder Lens,
1 Folding Tripod,
1 Double Plate-Holder,
1 Package S. P. C. Ferrous Oxalate Developer,
2 Japanned Iron Trays,
1 Package Hyposulphate Soda,
1 Ruby Lantern,
1 Rubber Focus Cloth,
1 Package Carbutt's 4 x 5 Dry Plates,
1 Package Sensitized Paper,
1 4 x 5 Flat Printing Frame,
1 Jar Paste,
1 Package Mounts, round corners (Crimson),
1 Set S. P. C. Toning Solution,
1 Ounce Graduate,
1 Manual.

No. 2, $4\frac{1}{4}$ x $6\frac{1}{2}$ size, $10.00. No. 3, 5 x 7, $12.00.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

Important Notice!

We wish to remind Photographers that we are located at the center of photographic manufacture, consequently can supply **Solio, Kloro** or **Peerless Paper** fresh from the factory, or **Apparatus** of the **Eastman Kodak Company, Rochester Optical Co., Rochester Camera Mfg. Co., or Photo Materials Co.,** on short notice and at lowest prices. Prompt shipment.

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42 State Street,

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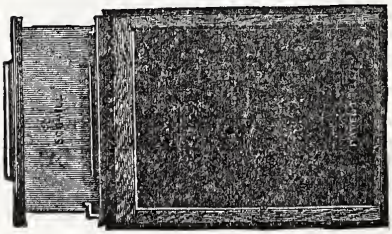
SCOVILL Light-Weight DOUBLE HOLDERS.

Substantial, serviceable and accurate double holders cannot be made smaller or lighter than the Scovill Light-weight Holders, and though so thin kits may be used in them. They yield a negative *the full width of the plate*, and, what is equally important, the plate may be placed in these holders or removed therefrom *without touching the sensitive surface* and *without danger of breaking it*. Observe the means shown in illustration for locking the slides. They are made with solid frame so that they *will not come apart, leak light, or warp*, and all have the *patent Registering Slides.*

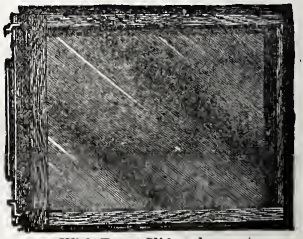
Price Light-weight Double Holder.

3¼x4¼	$1 10
4 x5	1 25
4¼x5½	1 25
4¼x6½	1 25
4¾x6½	1 30
5 x7	1 30
5½x7	1 40
5 x8	1 40
6½x8½	1 70
8 x10	2 00
10 x12	3 50
11 x14	5 00

Patented Nov. 15, 1887, and Jan. 24, 1888.



Showing Patent Registering Slide.



With Front Slide taken out.

FOUNDED 1865.

JNO. G. HOOD, Chairman. WM. D. H. WILSON, Treasurer.
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Only such goods as you order, and always at prices that you will approve.

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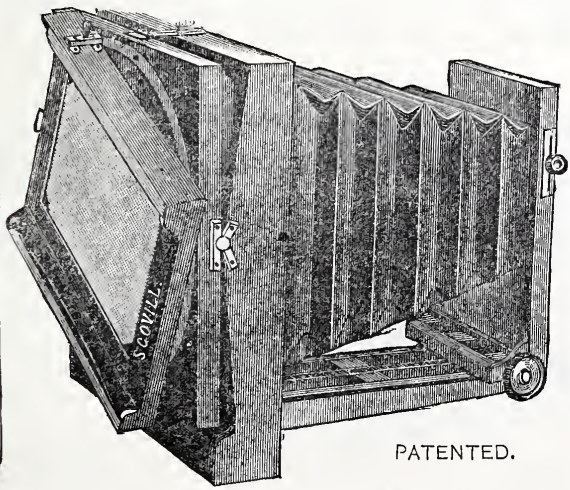
Outfits for Amateurs
A SPECIALTY.

SCOVILL
REVOLVING BACK CAMERAS
FRONT FOCUS PATTERN.



PATENTED.

FOR SALE BY ALL DEALERS.
SEE REDUCED PRICE-LIST IN NEW AMERICAN OPTICAL CO. CATALOGUE.

REVERSIBLE No.	For View	Sing. Sw.	Doubl. Sw.	With Reversible Back and Holder Extra
120	4 x 5 in.	$27.00	$32.00	.....
121	4¼ x 5½	29.00	34.00	.....
122	4¼ x 6½	31.00	36.00	.....
123	5 x 7	33.00	38.00	.....
124	5 x 8	35.00	40.00	.....
125	6½ x 8½	40.00	45.00	.....
126	8 x 10	45.00	50.00	.....

With Detachable Back. REVERSIBLE No.	For View	Sing. Sw.	Doub. Sw.	With Reversible Back and Holder Extra
127	10x12	$60.00	65.00	
128	11x14	65.00	70.00	$ 90.00
129	14x17	75.00	80.00	105.00
130	17x20	85.00	90.00	115.00
131	18x22	95.00	100.00	130.00
132	20x24	115.00	120.00	150.00

Buy from Dealers or the Scovill & Adams Co.

THE FLANDREAU OUTFITS.

THE FLANDREAU CAMERA folds up in so compact a form that the smaller size may be carried in a large overcoat pocket. In fact it embodies the advantages of the Scovill Tourist Camera, with much that is new and improved. The rods which are used to move forward the front of the camera are nicely adjusted, and are polished and nickel plated, so that they add to the handsome appearance of the camera, and contrast well with its polished mahogany surface and the dark hue of its bellows. In addition to this portable arrangement, the Flandreau box is reversible, has a liberal swing-back and front and rising front board. The bellows is cone shaped, and focuses by the forward movement. When closed for carrying the bed becomes a closing front board which is firmly secured at the top by a spring. The tripod head is fastened to this board so that, in adjusting, all that is necessary is to merely lower the front and fasten the tripod legs to the top, which is already secured beneath the board. The swing is held in any position by a new and very clever device. The ground-glass is hinged, as in English cameras, to throw over the top of the instrument.

---

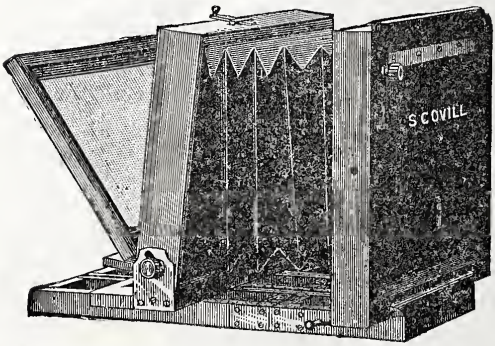
4 x 5 **Flandreau Outfit consists of** 4 x 5 **Flandreau Camera,** with
1 Daisy Double Dry-Plate Holder, with *Patent Registering Slides.*
1 Scovill Adjustable Tripod No. 1.
1 Canvas Carrying Case.

Price, complete, $20.00.

5 x 7 **Flandreau Outfit consists of** 5 x 7 **Flandreau Camera,** with
1 Daisy Double Dry-Plate Holder, with *Patent Registering Slides.*
1 Scovill Adjustable Tripod No. 2.
1 Canvas Carrying Case.

Price, complete, $25.00.

WATERBURY OUTFITS.



THE WATERBURY CAMERAS are made of mahogany, are well polished, have rubber bellows, folding platform, *patent latch* for making bed rigid instantaneously, single swing, vertical shifting front, and are as light and compact as substantial Cameras can be constructed.

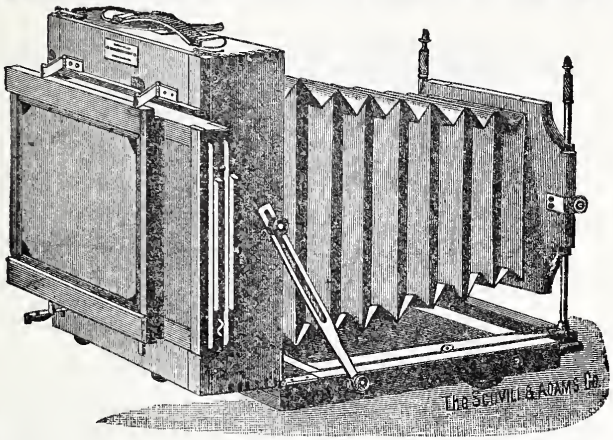
4 x 5 Waterbury Outfits, Complete **$12.00**

Consisting of single swing Camera, with new style holder, with registering slides (double dry), wood carrying case, Taylor tripod, and No. A Waterbury lens with revolving diaphragm.

4¼ x 5½	**Waterbury Outfits, Complete**	**14.00**
4¼ x 6½	" " "	**15.00**
5 x 7	" " "	**16.00**
5 x 8	" " "	**16.50**

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

THE COMPACT VIEW OUTFITS.



These Outfits comprise a Compact View Camera—which is a polished Mahogany box—with patent reversible swing-back, with turn-table on platform, and with raising front which can be set back on platform when Camera is used with a short-focus lens.

One Canvas Carrying Case for Camera.

One Scovill Adjustable Tripod.

PRICE LIST.

5 x 7 Compact View Outfit	$20 00	6½ x 8½ Compact View Outfit	$25 00
5 x 8 " " "	22 00	8 x 10 " " "	30 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

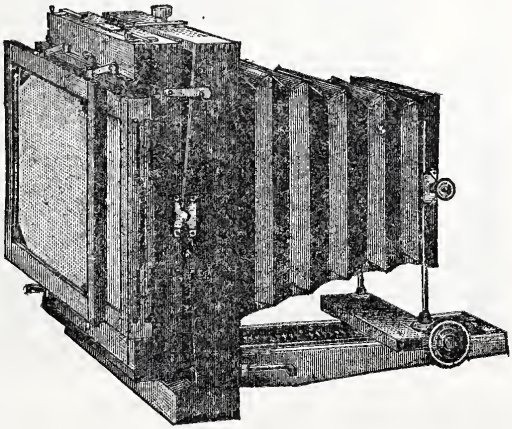
AMERICAN

OPTICAL CO'S Star View CAMERAS.

(PATENTED.)

The Star Reversible Back Cameras have the patent reversible back, with automatic latch, which allows Holder to be inserted without holding back the ground-glass frame, the rack and pinion movement, and the *patent latch* for making the bed rigid instantaneously.

Each Camera is supplied with one Daisy Holder with *patent Registering Slides* and canvas case.

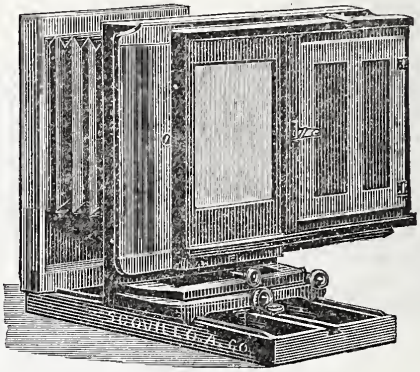


STAR REVERSIBLE-BACK CAMERAS.

	Double Swing-back.	Double Swing-back.
No. 110— 4 x 5	$25 00	$29 00
" 111— 4¼ x 5½	26 00	30 00
" 112— 4¼ x 6½	30 00	34 00
" 113— 5 x 7	32 00	35 00
" 114— 5 x 8	34 00	38 00
" 115— 6½ x 8½	36 00	40 00
" 116— 8 x 10	40 00	44 00
" 117—11 x 14	60 00	64 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

AMERICAN OPTICAL COMPANY ROYAL CAMERAS,

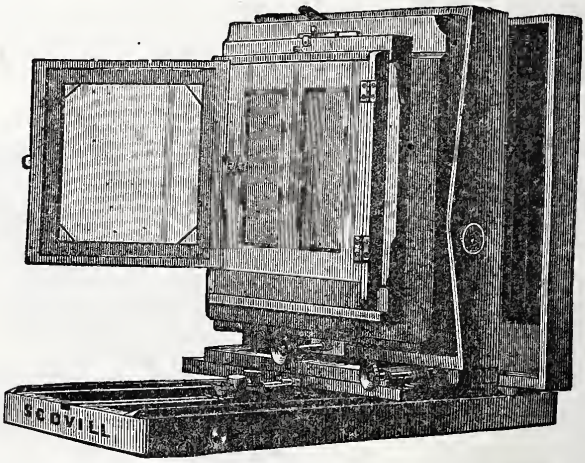


WITH WATERBURY CURTAIN-SLIDE HOLDER.

No. 40.— 8 x 10 Royal Camera, double swing-back..... $50 00
" 41.—11 x 14 " " " 85 00
" 42.—14 x 17 " " " 110 00

Above the 8 x 10 size an extra ground-glass is supplied for use in focusing when pictures of groups are being taken.

The American Optical Co.



Boston Imperial Cameras.

The 11 x 14 Boston Imperial Camera is the same as an 11 x 14 Portrait Camera, with the addition of an 8 x 10 Carriage and an 8 x 10 Holder, and is used to make two imperials on an 8 x 10 or 4-4 plate, using one 4-4 lens · two cards on a 5 x 8 plate, using one 1-2 size lens; two large panel pictures, 6 x 10 inches in size, can also be made, and regular work from 11 x 14 to 1-4 inclusive. All with Double Swing-back and Waterbury Holder.

No. 30.—11x14 Boston Imperial Camera, with 8x10 attachment and holder, $ 85 00
" 31.—14x17 " " " " 8x10 " " 100 00
" 32.—17x20 " " " " 8x10 " " 110 00
" 33.—18x22 " " " " 8x10 " " 120 00
" 34.—20x24 " " " " 11x14 " " 140 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

J. W. Bryant Co.'s

CONTINUOUS BACKGROUNDS : :

. . AND . .

✻ ARTISTIC ACCESSORIES.

Our OIL EXTENDED BACKGROUNDS are very popular. We have sold several thousand of them, but have not received one word of complaint on account of the extension, which rests on the floor, under the subject, and is painted in Oil, which makes them durable.

Our New Accessories are painted in oil of a cream color, and is ornamented in Gold. They are upholstered in Creton of a light, rich photographic tint.

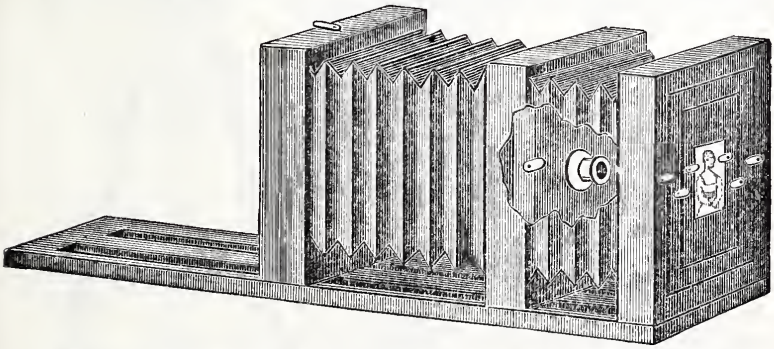
Our Backgrounds and Accessories are in use in the best galleries all over the world.

Our new samples are now ready and will be mailed on application, but must be returned in five days.

J. W. BRYANT CO.

La Porte, Ind., U. S. A.

The Scovill Enlarging, Reducing and Copying Cameras.



When ordering, please specify number and sizes of kits, also style of Holder wanted.

No. 61.–	Size, 6½x8½	Price,	$30.00
" 62.	" 8x10	"	35.00
" 63.	" 10x12	"	48.00
" 64.	" 11x14	"	60.00
" 65.	" 14x17	"	72.00
" 66.	" 17x20	"	90.00
" 66½.	" 18x22	"	100.00
" 67.	" 20x24	"	110.00

$5.00
Hand Camera
$5.00

Frank McLaughlin's

New England

Rattler

This is the best hand
Camera for the price ever produced.

: : : : Sent C. O. D.
Satisfaction guaranteed
or money refunded : :

Address Sole Agents

Scovill & Adams Co.

423 Broome St., N. Y.

The Daisy Tripod.

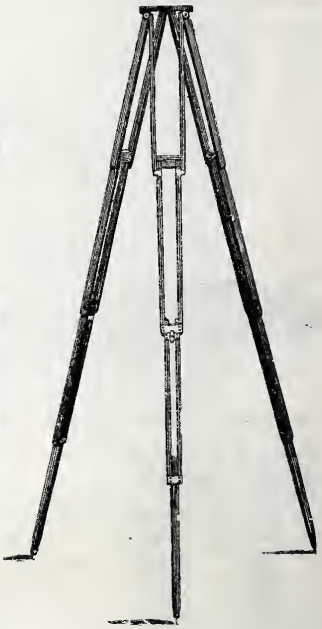
(For Tourists and the Ladies.)

An inspection of one of these Tripods will convince the most skeptical that it has no superior for ease of adjustment, lightness and compactness.

Length, when folded, 16½ inches.

Weight, 2 lbs.

≋ Price, $5.00. ≋



For Sale by all Dealers in Photographic Materials and the Scovill & Adams Co.

SOLD

All Material and Apparatus used in Photography. Orders filled promptly at lowest rates.

Kodaks in full supply.

W. D. GATCHEL, Agt.,

343 W. Jefferson St., LOUISVILLE, KY.

THE PLATINOTYPE.

COLD BATH (black tone only) and
HOT " (Sepia tone).

Both much improved during the past year. The marvelous ease of working these papers, and the artistic results produced, make **The Platinotype** the best process in existence for both Professionals and Amateurs.

Address the Proprietors,

WILLIS & CLEMENTS,
1624 Chestnut St., PHILADELPHIA, PA.

The Scovill Economic Lenses.

These Lenses are intended to fill the want experienced by thousands of successful workers with the Waterbury Lens for a good, low-priced Rectilinear Wide-Angle Lens, whereby they can gain artistic defects in perspective at short distances.

PRICE SCOVILL ECONOMIC LENSES.

No.	Size of Plate.	Back Focus.	Equivalent Focus.	Price.
3	6½ x 8½	6 inches	6½ inches	$15 00
4	8 x 10	8 "	8½ "	20 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

O. C. CO.'S
SPECIAL BLUE PAPER

We now mail this paper to every State in the Union and Canada.

PRICE, 25c. PER YARD.

(27 in. wide) cut to any size. Postage Paid.

SOLD ONLY AT 163 BROADWAY.

O. C. CO.'S
SPECIAL SOLUTIONS

The BEST in the land, and go furthest.

Hydrochinone, 30c.
Pyro and Potash, 60c.
Toning Solution, 50c.

SOLD ONLY AT 163 BROADWAY.

KODAKS—New Styles and Sizes, $6.00 to $75.00.

KODAK FILMS, KODAK PLATE ATTACHMENTS, KODAK INSTRUCTIONS

HAWKEYES—New Model, Regular and Folding.
KAMARETS, PREMIERS, HENRY CLAYS,
TRIADS, TOM THUMBS, BULLS-EYES.

ALWAYS IN STOCK. KODAKS RELOADED WHILE YOU WAIT.

O. C. CO.'S
Printing and Developing

MOUNTING IN ALBUMS, ETC., AT EASTMAN'S PRICES.

All work done Promptly and as agreed

AT 163 BROADWAY.

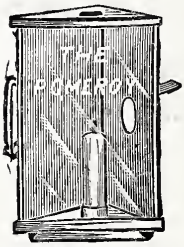
O. C. CO.'S
Repairs to Kodaks

AND ALL HAND AND TRIPOD CAMERAS Done by skilled workmen.

Send your name for Pocket Catalogue and mention this book

TO 163 BROADWAY.

THE OBRIG CAMERA CO. 163 Broadway, N.Y.



HAS RUBY GLASS.
Size, 6½ x 4¼ Inches.

We would respectfully call your attention to

"THE POMEROY DARK-ROOM LAMP,"

which has taken a front rank as a lamp of this kind.

1st.—Because it has perfect ventilation.

2d.—Because being triangular in form it can be folded without complication, and occupies a space not greater than Webster's Pocket Dictionary, 6½ x 4¼ inches.

3d.—Because it has a socket to take candles, which may be procured in any part of the country; the annoyance of loading one's self with a supply is avoided.

4th.—Because there are no small chimneys to be broken or cleaned, nor adjusting of wicks.

5th.—Because it stands more firmly than all others, and is of the proper size, and gives proper light.

6th.—Because it has folding handles, and may be carried without burning one's fingers.

7th.—Because the flame is so readily controlled, having light-tight slide at side.

8th.—Because it comes all complete in a pasteboard box, less candle, for 75 cents, and can be mailed to any part of the United States for 10 cents postage extra.

FOR SALE BY

THE SCOVILL & ADAMS COMPANY.

Geo. J. Wolf & Co.

918 Arch Street, Philadelphia.

PHOTOGRAPH SUPPLIES GENERAL.

Dear Sir: Permit us to call your attention to the fact that we are carrying a full line of Cameras, Lenses, Plates, Chemicals, Paper and Card Stock suited to your wants Photographic, and should be pleased to receive a share of your patronage.

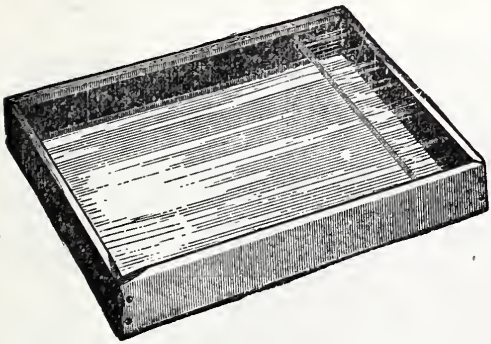
Very truly yours,

GEO. J. WOLF & CO.

P. S.—If you are a professional photographer we can also supply you with Back-grounds and accessories in great variety.

The Acme Glass-Bottom Developing-Trays,

FOR DRY PLATES.



THESE Trays enable the operator to develop a plate without removing it from the solution until fully developed.

The Acme Trays are made of Walnut, with Glass Bottoms, and Receptacle at one end to hold the solution while looking at the plate. They also have buttons adhering to the glass to prevent suction.

The Acme Trays are superior to all others in respect to cheapness, durability and cleanliness. They are lined with acid proof cement, and warranted not to leak.

PRICES FOR TRAYS WITH RESERVOIR TO DEVELOP.

5 x 7 Plate and smaller	$1 00	6½ x 8½ Plate	$1 25
5 x 8 "	1 20	8 x 10 "	1 30

20 x 24 Trays for silvering whole sheets, without reservoir, but with double-thick glass bottom.....$5 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

"It Won't Cockle."

HIGGINS' PHOTO MOUNTER

The New Adhesive for Mounting Photographs, etc.

Not a starch or flour paste, but a Vegetable Glue, semi-fluid and always ready for use. Of soft and unctuous consistency and pure white color, and never changes. Guaranteed not to warp, cockle, strike through, nor injure the tone or color of any mount. Never spoils or deteriorates.

FOR SALE BY ALL DEALERS.

Chas. M. Higgins & Co. Sole Manufacturers

168–170 Eighth Street, Brooklyn, N.Y., U. S. A.

"NON-COCKLE,"

For Mounting Prints.

40 CENTS PER BOTTLE.

THE SCOVILL & ADAMS CO., Trade Agents.

THE MULLETT BROS. PHOTOGRAPHIC SUPPLY CO.

518 WALNUT STREET,

KANSAS CITY, MO.

WHOLESALE DEALERS IN : : :

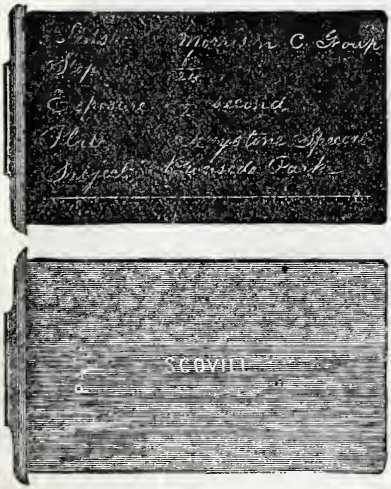
Photographers' Supplies

All leading brands of Dry Plates and Papers.

All Orders
Have prompt attention
At fair and reasonable prices.

WE SOLICIT YOUR BUSINESS.

REGISTERING SLIDES.



IN the pleasure or excitement attendant upon picture-taking, holders and slides have been so changed about that the note-book afforded no clue to their identity. All photographers, whether professional or amateur, who have in time past puzzled their brains in the endeavor to solve such vexatious questions as these:

"Have I or have I not exposed that plate?"

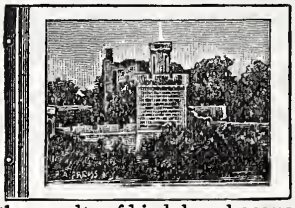
"If exposed, was the plate used for that prized picture?"

"Shall I incur the risk of making a double exposure?"

henceforth will have themselves only to find fault with if they do not procure and use in their dry-plate holders the patent registering slides, or as they have been called "Record Slides." These can be written upon with slate or lead pencil *ad libitum*, and the writing erased without injury to them.

Patent Registering Slides are supplied with all American Optical Co. Dry Plate Cameras and Amateur Outfits up to 10 x 12 size without addition to price list.

HOWARD · ALBUMS.



This cut illustrates a single card with picture mounted, ready for binding into the album.

A collection of 25 or 50 cards are bound together in an album by a strong binding cord suitably attached to the handsome covers.

This method of making an album affords the amateur the best means of preserving the results of his labor, because each picture may be finished before putting the card in the album. The arrangement of the pictures may also be altered at will—if a single card is spoiled the whole album is not ruined. If a picture is taken out, it can be quickly and readily done without injury to the volume.

PRICE OF HOWARD ALBUMS.

Full Cloth, Embossed, Gold Label, with A. M. Collins Manufacturing Co.'s No. 1 Cards.

		With 25 Collins Cards.
No. 1 — 6x 7 Cards, for 4 x 5 Photographs		$1 25
" 2 — 7x10 " " 5 x 8 "		1 50
" 2½— 8x10 " " 6½x 8½ "		2 00
" 3 —10x12 " " 6½x 8½ "		2 25
" 4 —11x14 " " 8 x10 "		2 50

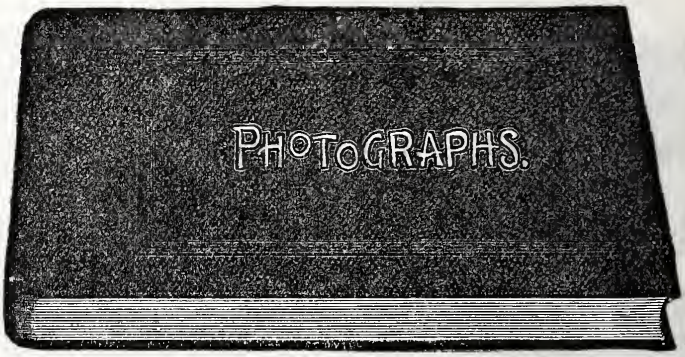
Morocco, Half Leather, Extra Gold Finish, with A. M. Collins Manufacturing Co.'s Cards. Boxed.

	With 25 Collins Cards.	With 50 Collins Cards.
No. 5— 7x10 Cards, for 5 x 8 Photographs	$2 00	No. 11—$3 50
" 6— 8x10 " " 6½x 8½ "	2 50	" 12— 4 00
" 7—10x12 " " 6½x 8½ "	3 00	" 13— 4 75
" 8—11x14 " " 8 x10 "	3 50	" 14— 5 50
" 9—14x17 " " 10x12 or 11x14	5 50	" 15— 9 00
" 10—16x20 " " 11x14 or 14x17	7 75	" 16—11 00

HOWARD ALBUMS

With Interchangeable Cards for Photographs.

(PATENTED AND LABEL REGISTERED.)



The Howard Album, with interchangeable cards, is the latest novelty in the way of an album for mounting photographs. In handsomely embossed covers are bound 25 of Collins' cards, which are chemically pure from all matter that would injure the photographs. In the mode of binding, and their interchangeable feature, lies the difference between this and other Albums.

Each card is mounted independently with a metallic bearing surface at the outer edge, protecting the holes through which the binding cord passes from tearing out.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

"NOW THEN," or Flash Light Wonder,

$2.00.

"IMPERIAL" Magnesium Flash Lamp,

$4.50.

AWARDED MEDAL OF EXCELLENCE BY AMERICAN INSTITUTE.

Patented December 17, 1889. BEWARE OF INFRINGEMENTS.

FOR SALE BY ALL DEALERS.

MANUFACTURED BY

H. B. SHELDON, Jr., ✳ 134 Pearl Street, N. Y.

The ⁘ Scovill ⁘ Magnesium ⁘ Compound

IS ENTIRELY FREE FROM POISONOUS INGREDIENTS.

In order to demonstrate this, quantities have been eaten at various times. It has often been pounded in a mortar to show that it does not explode.

The results obtained by using our Magnesium Compound have never been surpassed.

PRICE OF SCOVILL MAGNESIUM COMPOUND.

In ounce bottles, with fuses	$ 50
In quarter pound cans, with fuses	1 40
In half " " " "	2 65
In one " " " "	5 00
In five " " " "	20 00

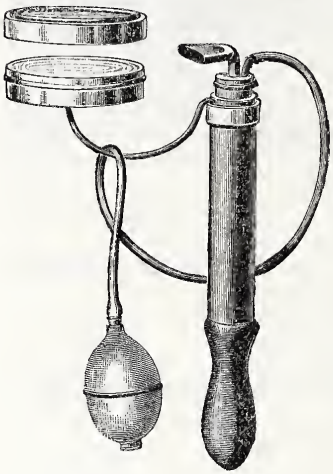
PRICE OF SCOVILL MAGNESIUM CARTRIDGES.

	Per Pkg.	Per Gro.
No. 1, Small Size, in packages of six	$0 25	$6 00
No. 2, Medium, " "	40	9 00
No. 2½, in packages of six	60	13 00
No. 3, " "	75	17 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

THE LITTLE GIANT

Repeating Flash Lamp.



Patented September 2, 1890.

SAFE,

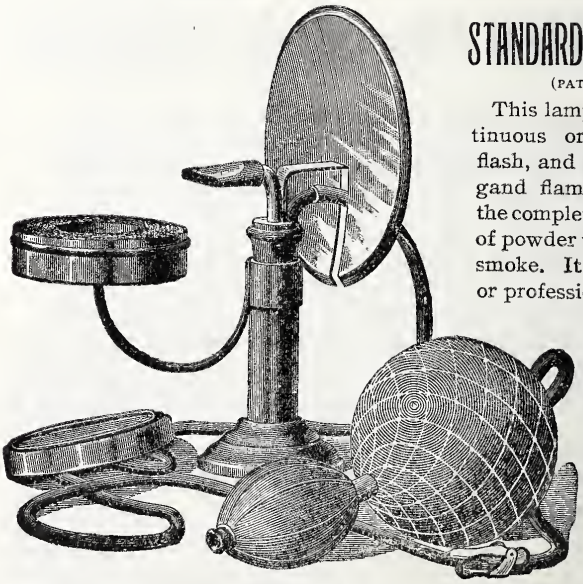
CONVENIENT

AND

POWERFUL.

Embodying the same principle as the Standard lamp, and producing a number of intensely brilliant flashes from one charge.

Price, Boxed, $2.50.



THE

STANDARD FLASH LAMP

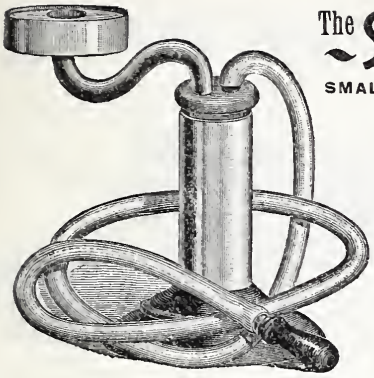
(PATENTED.)

This lamp gives a continuous or intermitting flash, and having an Argand flame box insures the complete consumption of powder with minimum smoke. It is for amateur or professional use.

Two or more of these lamps can be flashed instantaneously from different points.

Price, $4.50.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.



The SIMPLEX Magazine Flash Lamp.

SMALL, SAFE, AND INTENSELY BRILLIANT.

PRICE, $2.00.

Before purchasing any other, examine our various lamps, now being used to the exclusion of all others. Prices range from $2.00 to $7.50. They are the BEST, and are known as the "Standard," "Standard Triple," "Ajax," "Little Giant" and "Simplex." Send for circulars.

PHYSICIANS' SUPPLY MFG. CO.

140 & 142 Nassau St., New York.

JAMES S. CUMMINS,

Photographic Supplies,

No. 106 N. CHARLES STREET,

BALTIMORE, MD.

Photographers!

Look out for imitations of

WATERBURY CARDBOARD.

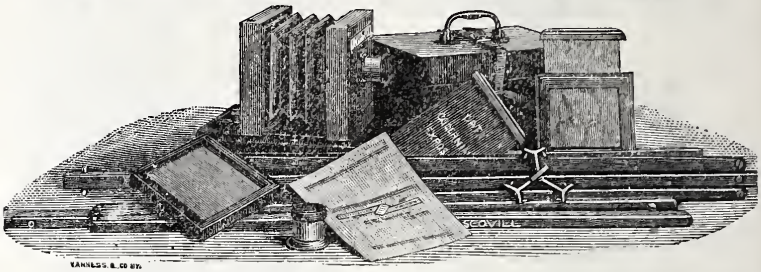
Look out for the genuine, too, and see that you get it.

It is the Best and Cheapest.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

FAVORITE AMATEUR OUTFITS.

All parts of which are Warranted Accurate in every respect.



These Outfits are lighter, more compact, far handsomer and more accurate than any which are offered at the same price. Many professional photographers have bought them and use them constantly. *In each outfit the Waterbury Lens is worth the price charged for the entire outfit.*

PRICE LIST.

4 x 5 Favorite Outfit	$10 00	5 x 8 Favorite Stereoscopic Outfit	$18 50
5 x 7 " "	12 00	6½ x 8½ " " "	15 00
5 x 8 " "	12 00	8 x 10 " " "	25 00

Favorite Outfits consist of a Favorite View Camera with vertical shifting front, single-swing movement, rubber bellows and folding platform, with patent latch for making bed rigid instantaneously; also, 1 Patent Double Dry-Plate Holder (Reversible), with patent Registering Slides, and with Kits; 1 Taylor Improved Folding Tripod; 1 "Waterbury" Achromatic Lens, with a set of stops, and 1 Carrying Case.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

STEREOSCOPIC OUTFIT

For Instantaneous or Timed Exposures.

WE ARE NOW CONSTRUCTING STEREOSCOPIC OUTFITS CONSISTING OF

A 5-8 Stereoscopic Camera,
One pair matched Waterbury "A" Lenses fitted with the Stereoscopic Elite Shutter,
One 5-8 light-weight double Dry-Plate Holder.
One No. 2 Scovill Extension Tripod,
One Wood Carrying Case,

For the moderate price of $27.00.

We will furnish a pair of matched Waterbury A Lenses, fitted with the Stereoscopic Elite Shutter, for - - $20.00.

The ELITE SHUTTER recommends itself on account of its simplicity of construction, rapidity of motion, and its extremely low price.

The WATERBURY A LENS, with stop f /25, covers a stereoscopic plate to perfection, and with a plate of average high sensitiveness will produce correct exposure by the very rapid speed of the "Elite."

The Shutter is arranged for instantaneous as well as timed exposure, is neatly and accurately made, and does not get out of order.

For sale by all dealers in photographic goods, and the manufacturers,

The Scovill & Adams Company, 423 Broome St., New York.

PHOTO SPECIALTIES

Steinheil Lenses for Portraits, Landscapes, and Photo-mechanical Work

Steinheil Telephotographic Lenses (New)

Aladdin Dark-Room Lamp

Safety Flash Igniter

Mica Plates (New)

Dresden Albumen Paper

Emulsion Gelatine—Lichtdruck Gelatine

Write for Catalogues and prices, naming specialties in which you are interested.

H. C. RAMSPERGER & CO.

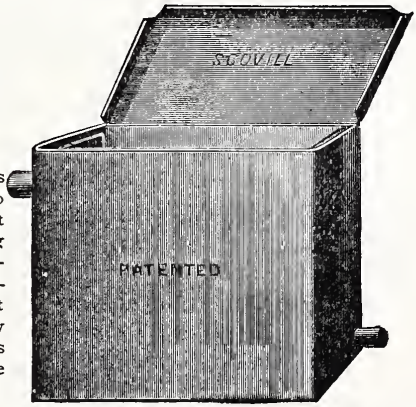
180 Pearl Street, NEW YORK, N. Y.

THE SCOVILL

NEGATIVE-WASHING BOXES.

(*Patented.*)

The Scovill Negative-Washing Boxes are all now made adaptable, and so that plates may be taken out without putting the fingers in the washing water. (See illustration.) The perforated bottom prevents water from passing through the box with too great force, and distributes it so that every plate and every portion of a plate is equally washed, and this cannot be done with any other washing box.



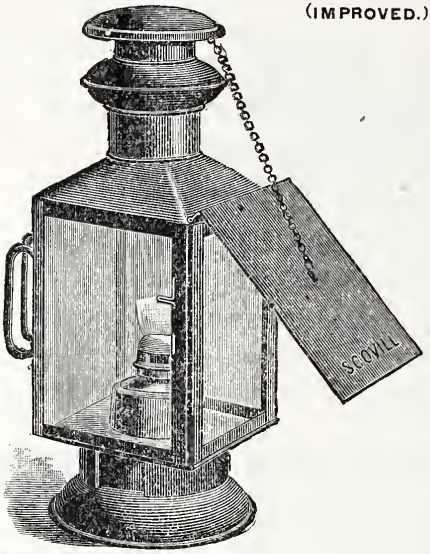
PRICE LIST (Adaptable).

		EACH.
For 3¼ x 4¼ Plates		$1 60
" 4 x 5 "	and adaptable for smaller sizes	1 75
" 4¼ x 5½ "	" " "	1 90
" 4¼ x 6½ "	" " "	2 00
" 5 x 7 "	" " "	2 10
" 5 x 8 "	" " "	2 15
" 6½ x 8½ "	" " "	2 25
" 8 x 10 "	" " "	2 50
" 10 x 12 "	" " "	4 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

THE SCOVILL PEERLESS DARK-ROOM LANTERN.

(IMPROVED.)



"This is without question the best Lantern for the Photographer's use yet introduced."

Such is the reports of experts who have had them in use for months.

Why they were agreed in their conclusions:

BECAUSE the ventilation is perfect, and danger of over-heating overcome.

BECAUSE it is constructed so that white light does not escape.

BECAUSE it gives ample light for the dark-room.

BECAUSE the abundant light does not fog, but does show any spot or blemish in the plate.

BECAUSE so much of the light may be thrown into the developing dish and be shaded from the eyes.

BECAUSE it may be used either with coal oil or candle.

BECAUSE the flame may be so quickly controlled by unlatching the door or uncatching the bottom of the Lantern.

PRICE, $2.50.

THE "BOSTON MAT" was designed by Wm. G. Reed, of the Boston Camera Club, for the purpose of simplifying the task of mounting slides, having the openings all *harmonious*, if not uniform, and to enable the maker to so prepare a set that all will "register" when projected.

TESTIMONIALS.

Mr. Wm. G. Reed,

Dear Sir:—Your mat is the "greatest labor saving invention of the age." Please send me two hundred more.

Mr. Garrison Reed,

Dear Sir:—I have just returned from Japan with several hundred unmounted slides, which I wish to mat with the "Boston Mat." I have told many people of the excellence of your mat, and shall continue to do so, for to me it seems the only sensible one.

Mr. Wm. G. Reed,

Dear Sir:—I have found your ingenious lantern-slide mat exceedingly convenient and useful.

The originals of above letters may be seen in our New York Office.

The Boston Mat,

PRICE, 50 CTS. PER HUNDRED.

Is for sale by the trade generally. If your local dealer has none, send order to

THE SCOVILL & ADAMS CO.,

SOLE AGENTS,

423 BROOME ST., NEW YORK.

AT LAST

We have found a perfectly Neutral and Chemically Pure Brand of

Sulphite of Sodium

Which is so necessary in the preparing of developers, especially with **Amidol, Para-amidol-phenol, Eikonogen, Hydrochinon, Pyrogallol, and the other organic reducing agents.**

Dr. M. Andresen, of Berlin, renowned for his discoveries of the modern developers, understood well the necessity of a reliable preservative of these substances when in solution, and he made

A Pure Sulphite of Sodium in Crystals.

THE SCOVILL & ADAMS CO. are Sole Agents for this much desired substance in the United States.

Price, in ¼ lb. cans,	- -	20 cents.
" ½ " "	- - -	25 "
" 1 " "	- -	35 "

ASK YOUR DEALER FOR ANDRESEN'S SULPHITE.

A GREAT CONVENIENCE IN DEVELOPING DRY PLATES.

PELLETONE

Pyrogallic

Acid Tablets,

Put up in bottles, each containing 100 2-grain (*exactly* 2 grains) tablets of

SCHERING'S

Unrivaled Pyrogallic Acid.

Price per Bottle, reduced to 40 Cts.

FOR SALE BY ALL DEALERS, AND

THE SCOVILL & ADAMS CO.

Another Power.

"I have put the

Swift Lenses

through hard, and they please me very much. They are another power that I gladly welcome. * * * * I would not part with them for double their cost."

B. W. Kilburn, World's Fair Photographer.

THE MORRISON

WIDE-ANGLE VIEW LENSES.

These Lenses are absolutely rectilinear; they are the most rapid, and are universally conceded to be the BEST WIDE-ANGLE LENSES MADE.

No.	Diameter of Lens.	Size of Plate.	Equivalent Focus.	Price.	
0	1 inch	3¼ x 2¼ inch		$20 00	
3	1 "	4¼ x 4¼ "		25 00	
4	1 "	5 x 8 "	5½ inch, each,	25 00	These 3 sizes will fit into 1 flange.
5	1 "	6½ x 8 "	6½ " "	25 00	
6	1 "	8 x 10 "	8 " "	30 00	
7	1¼ "	11 x 14 "	10½ " "	40 00	These 2 sizes will fit into 1 flange.
8	1¼ "	14 x 17 "	14 " "	50 00	
9	1½ "	17 x 20 "	17 " "	60 00	These 3 sizes will fit into 1 flange.
10	1½ "	20 x 24 "	22 " "	80 00	
11	1½ "	25 x 30 "	28 " "	100 00	

☞ Nos. 1 to 6 are all made in matched pairs for stereoscopic work. The shorter focused Lenses are especially adapted for street and other views in confined situations. For general purposes, a pair of No. 5 Lenses will be found most useful.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

Just Right

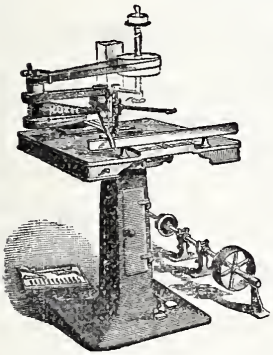
"The '**Henry Clay**' is just right—perfection."

B. W. Kilburn, the World's Fair Photographer.

Scovill & Adams Co.
423 Broome St., N. Y.

ROYLE'S
PHOTO-ENGRAVERS'
Machinery and Tools

ARE KNOWN THE WORLD OVER FOR THEIR



EXCELLENCE AND EFFICIENCY.

JOHN ROYLE & SONS,

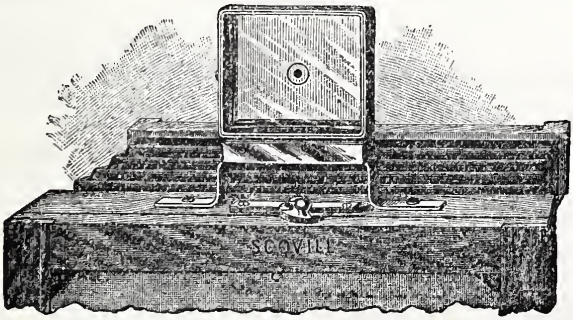
Paterson, N. J.,

U. S. A.

SCOVILL MAGIC FINDERS,

(PATENTED.)

Unequaled for Landscape Photography.



One sees through them a marvelously clear *non-reversed* image *the exact proportion* of the reversed one on the ground-glass. The Magic Finders are light, ornamental, easily adjusted and detached, and pronounced a great convenience by view takers.

PRICE LIST.

No. 1, for 4x5 Camera	$1 50	No. 3, for 6½x 8½ Camera	$2 25
" 2, " 5x8 "	1 75	" 4, " 8 x 10 "	2 75

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

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Photo-Engravers' Supplies.

ENGRAVERS' STEEL AND COPPER PLATES.

Zinc, Copper and Brass Plates for Photo-Engravers.

SELLERS' TRANSFER ETCHING AND PROVING INKS.

ROLLERS, ALL KINDS.

Printing Frames, "Extra Strong" Etching Powders, English Charcoal, Etching Tubs and Supplies in General.

Wedding, Business and Visiting Card Plates, Steel and Brass Monogram Dies, and all Engravers' Sundries.

"SCREEN PLATES FOR HALF-TONE PROCESS."

Photo-Engraving taught in all Processes. Enamel Process a Specialty.

ALFRED SELLERS & CO.,

58 Fulton Street, New York, N. Y., U. S. A.

SEND FOR ILLUSTRATED PRICE LIST.

CLEMONS'

New Matt-Surface Paper.

After many years of scientific research a preparation for the salting of plain photographic paper has been discovered, by which method the finest printing results are obtainable. The advantages are apparent to all.

I.—Constant use will not discolor the silver bath.

II.—Will produce the finest detail in printing.

III.—Any desired tone may be obtained from sepia to jet-black with less gold than ever before.

IV.—The "*New Matt-Surface*" paper when sensitized will keep fresh for a long time if properly stored.

V.—The price has not been advanced.

FOR SALE BY

THE SCOVILL & ADAMS COMPANY.

Sample Sheets, by mail, 10 cents each.

Amateurs are generally
full of

? ? ? ? ?
? ? ?
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We will be glad to answer (if we can) any photographic question that you will ask us. Meantime we will ask you a question: have you sent for our catalogue?

Scovill & Adams Co.
423 Broome St., N. Y.

FELT BACKGROUNDS.

The Scovill & Adams' Plain Felt Background, recently introduced, is a great boon to all Photographers, both Professional and Amateur.

It is made of strong, thick and even stock, and is of an agreeable neutral drab color. It is especially suitable for vignetting. The texture of the cloth absorbs instead of reflecting light, and thus produces soft effects, and agreeable depth in print. The liability of defacement by water stains is obviated.

The prices of these grounds are as follows:

4 x 6 feet	$2 50
5 x 6 "	2 75
6 x 6 "	3 00
6 x 7 "	3 50
6 x 8 "	4 00

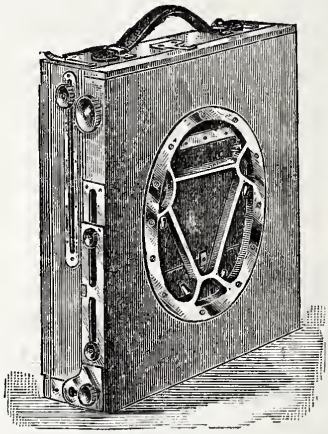
These sizes may be sent by mail on receipt of 35c. extra.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

DOUGLASS & SHUEY CO.

The New
"CARLTON"
Camera.

SEND FOR PRICE LIST.



LIGHTEST
LATEST
AND
BEST.

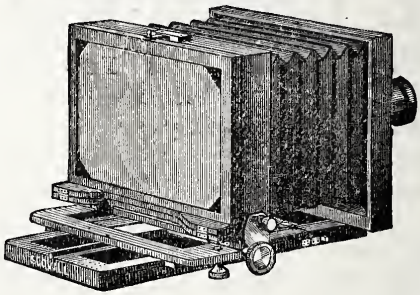
We get the Novelties first and have them all the time.

IMPORTERS AND DEALERS IN

Everything Used in Photography.

DOUGLASS & SHUEY CO. 111 State Street, Chicago, Ill.

ELITE VIEW OUTFITS.



AN ELITE VIEW OUTFIT COMPRISES:

One Single Swing Mahogany-polished Camera, with vertical shifting front; Rubber Folding Bellows and Rack and Pinion Focusing Adjustment.

By means of the side plate the Camera may be reversed when vertical views are desired. To this Camera, which is very light and compact, is fitted one of the incomparable Light Weight Holders, with Patent Registering Slides. The Outfit also comprises

A SCOVILL EXTENSION TRIPOD,
A WATERBURY ACHROMATIC LENS,
WITH REVOLVING STOPS,
AND A CARRYING CASE.

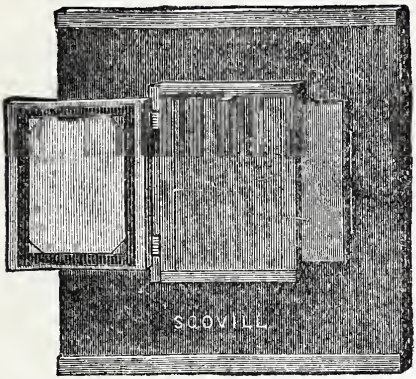
PRICE LIST.

Size of View.		Size of View.	
4¼ x 6½	$17 00	5 x 8	$18 00
5 x 7	17 50	6½ x 8½	22 00

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

THE AMERICAN OPTICAL CO.'S

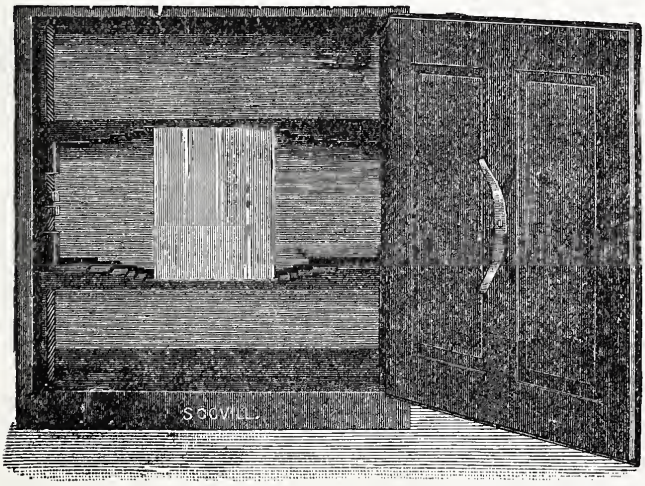
CABINET PLATE HOLDER ATTACHMENT



Consists of a board the same size of the plate-holder of the camera. It is put in place the same as holders. upon pegs, with spring catch at top In center of board is an opening with hinged ground-glass to receive the holder selected, 4¼x6½, 5x7, or 5x8. Can be fitted to any 8x10 or larger portrait camera by sending exact size of plate-holder. When wishing to use larger plates can be instantly removed. By the aid of this attachment and twelve single light-weight holders you always have a supply of plate-holders loaded and ready for use, save the expense of large extra holders and many a trip to the dark-room, and you are sure of always getting your subject in the proper position on the plate.

For 8 x 10	Am.	Optical	Co.	Best	Portrait	Camera	with	one single Light-Weight Holder, price,	$8 00
" 10 x 12	"	"	"	"	"	"	"	"	9 00
" 11 x 14	"	"	"	"	"	"	"	"	10 00
" 12 x 15	"	"	"	"	"	"	"	"	11 00
" 14 x 17	"	"	"	"	"	"	"	"	11 00
" 15 x 18	"	"	"	"	"	"	"	"	12 00
" 17 x 20	"	"	"	"	"	"	"	"	13 00
" 18 x 22	"	"	"	"	"	"	"	"	13 00
" 20 x 24	"	"	"	"	"	"	"	"	14 00

THE GREAT STUDIO PLATE-HOLDER.



THE WATERBURY HOLDER may be adjusted to various sizes of plates quicker and easier than any other Holder. No kits are required, and the plates used must be in the center, and may be laid in the proper place in the dark.

The WATERBURY HOLDER requires no latches to secure the plate firmly in place. The mechanism is so simple that it cannot get out of order except by destroying the Holder.

The WATERBURY HOLDER adjustments work with entire freedom and yet without vibration or side-play.

The Bonanza Holder was acknowledged to be the best wet-plate Holder; and every candid man will admit that the WATERBURY HOLDER is the best dry-plate Holder for gallery use.

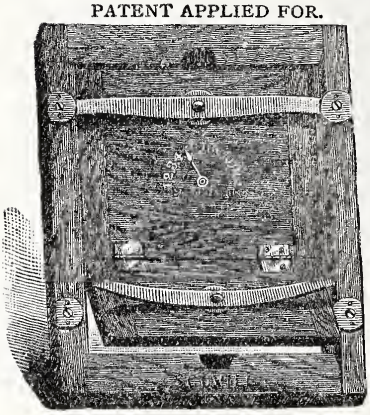
This Holder, with Roller Slide, supplied with American Optical Co. Portrait Cameras.

SCOVILL PRINTING FRAMES

ARE NOW MADE WITH TALLY.

The Scovill Printing Frames are made of cherry, and have superior brass springs constructed on scientific principles. On the flat printing frames, these springs are secured by rivets and turn on brass washers, being held at the end by buttons made so that they cannot turn around.

PATENT APPLIED FOR.



SCOVILL FLAT PRINTING FRAMES.

They are so constructed that a uniform pressure is obtained, thus insuring perfect contact between the paper and the negative, and removing the danger of breaking the latter.

The back-boards are also so arranged that the progress of the printing may be watched without danger of shifting the paper, and each frame has the tally shown in the illustration.

For Plates.	Regular Flat or Two-Thirds.	Deep.	For Plates.	Regular Flat or Two-Thirds.	Deep.
3¼ x 4¼	$0 36	$0 75	13 x 16	$2 25	$2 75
4 x 5	38	75	14 x 17	2 45	3 00
4¼ x 5½	40	75	16 x 20	4 50	4 75
4¼ x 6½	42	85	17 x 20	4 50	4 75
5 x 7	50	95	18 x 22	5 00	5 25
5 x 8	52	95	20 x 24	5 50	5 50
6½ x 8½	60	1 25	24 x 30		9 00
8 x10	75	1 60	35 x 45		16 00
10 x12	1 00	2 00	30 x 60		22 00
11 x14	2 00	2 50			

The SCOVILL PRINTING FRAME PADS.

FOR		1st Quality, GRAY.
3¼ x 4¼	Frames, in boxes, per doz	$0 24
4 x 5	" " "	33
4¼ x 5½	" " "	36
4¼ x 6½	" " "	38
5 x 7	" " "	54
5 x 8	" " "	57
6½ x 8½	" " "	84
8 x 10	" " "	1 44
10 x 12	" " "	2 16
11 x 14	" " "	2 88
14 x 17	" " "	4 08
16 x 20	" " "	5 04
17 x 20	" " "	5 28
18 x 22	" " "	6 48
20 x 24	" " "	8 40

The above goods are very desirable, and the demand for them is increasing. They are put up in boxes containing one dozen pads each.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

THE LATEST IN CAMERAS.

The Pocket-Book Camera,

SOMETHING NOVEL AND VERY ATTRACTIVE.

Just the Thing for the Holidays, and all Days.

This is NOT A TOY, but a REAL CAMERA, with a good Lens, capable of making pictures 1⅞ inches square.

The POCKET-BOOK itself is a well-made **Russia Leather** one, lady's size, which can be used as an ordinary purse.

The Pocket-Book Camera complete, $3.00.

With Half-Dozen Dry Plates.

Ask your dealer for one, or send direct to

THE SCOVILL & ADAMS COMPANY,

423 BROOME STREET, NEW YORK CITY.

THE BEST Developer for Lantern Slides.

S. P. C. Amidol Developer,

made from Dr. Andresen's Pure Amidol.

TWO TESTIMONIALS:

"I want to say that Dr. Andresen's Amidol is immense. I recently made some lantern slides with it, and found that with one-third the exposure which other developers required, Amidol developed beautiful positives, just like wet plates in appearance. It is very energetic and powerful; but the best of it all is, that it makes a dry-plate slide look like the beautiful old collodion plate. I used the S. P. C. Amidol solution."

JOHN C. HEMMENT.

To the Editor of THE PHOTOGRAPHIC TIMES:

Dear Sir: * * * * * * * * * * * * * I send you also a lantern slide made with the Amidol developer, as you said that you had never tried it for diapositives. I found it works better for slides more highly diluted than for negatives, viz.: ½ ounce of your developer with 2 or 3 ounces of water, and this is sufficient for a dozen slides. I like it greatly.

DR. S. B. WARD.

[The slide is of an excellent neutral color, with splendid details and of absolute clearness.—Editor of THE PHOTOGRAPHIC TIMES.]

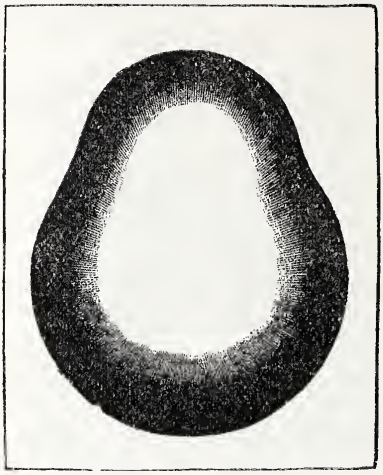
Put up in eight ounce (8 oz.) bottles, with full directions for use.

PRICE, 50 CENTS.

THE SCOVILL & ADAMS COMPANY, TRADE AGENTS.

WEYMOUTH VIGNETTE PAPERS.

WAYMOUTH'S VIGNETTE PAPERS are the best means for producing fine effects in printing. They are made in nineteen sizes; printed in black, yellow, and red bronze, to suit different qualities of negatives. They are not clumsy, do not break, cost but little, and are easy of application to any negative. They do away with all the older methods; and, in fact, they have no equal. We have quantities of testimonials; but the best guarantee of their quality and work is their increasing popularity and our increased sales. Better than any patent machine, and sell better every month.



PRICES:

In parcels containing one dozen, assorted, Nos. 1 to 5.....$0 50
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Assorted sizes and colors, by number, per package of 15.... ..... 1 00
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Nos. 6, 7, 11, 12 and 13, assorted sizes and colors, for large Cartes and Victorias, by number, per dozen..... 75
Nos. 8, 9, 10, 14, 15 and 15½, assorted sizes and colors, Cabinets and Whole size, by number, per doz. 1 00
Nos. 16, 17 and 18, assorted sizes and colors, Half Cabinets and Whole size, by number, per doz. 1 25
When ordering, state the number and color you want.

SCOVILL & ADAMS COMPANY, Trade Agents.

SCOVILL PRINT-ROLLERS.

SUPERIOR TO ANYTHING IN THE MARKET

THE Scovill Print-Roller is especially designed to be used in the place of the ordinary Squeegee in working film and paper negatives, bromide prints, for removing surplus water from albumen prints before mounting, etc.

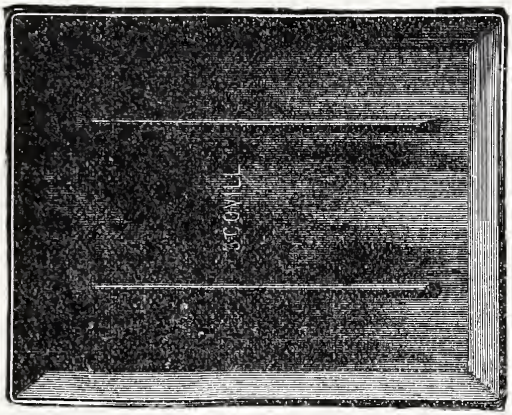
It is neatly constructed with black walnut handle, brass trimmings, and a heavily-covered rubber roller.

It will be found a very handy tool alike to the professional and amateur photographer.

Price, 8 inch, . $1.00 each.
" 12 " . 1.50 "

Buy from Dealers or the Scovill & Adams Company.

SCOVILL'S GLOSSY RUBBER TRAYS.

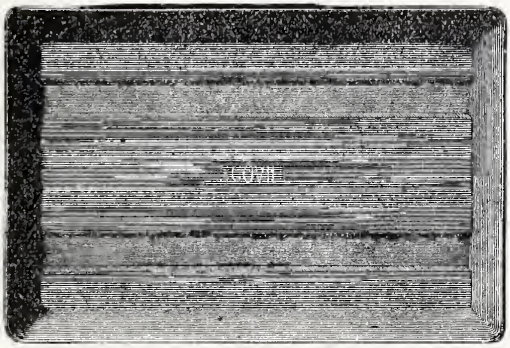


After a protracted and costly series of experiments, we are now able to offer to the trade, a superior article in texture, durability and polish. The utility of the parallel ridgelets must at once be apparent to the photographic practitioner.

PRICE LIST.

	Size.	Price, Each.
No. 200,	$4\frac{3}{8}$ x $5\frac{5}{8}$ for 1-4, 4-5, and $4\frac{1}{4}$ x $5\frac{1}{2}$ plates	$0 28
" 300,	$5\frac{1}{2}$ x $8\frac{1}{2}$ for 5 x 7 and 5 x 8 "	56
" 400,	7 x 9 for $6\frac{1}{2}$ x $8\frac{1}{2}$ "	72
" 500,	$8\frac{1}{2}$ x $10\frac{1}{2}$ for 7 x 9 and 8 x 10 "	1 08

CELLULOID TRAYS.



Size.		Price, Each.
$4\frac{1}{4}$ x $5\frac{1}{2}$	For 4 x 5 Plates	$0 50
$5\frac{1}{2}$ x $8\frac{1}{2}$	" 5 x 8 "	72
7 x 9	" $6\frac{1}{2}$ x $8\frac{1}{2}$ "	85
$8\frac{1}{2}$ x $10\frac{1}{2}$	" 8 x 10 "	1 15

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SWEET, WALLACH & CO.,

Photographic Goods

OF EVERY DESCRIPTION,

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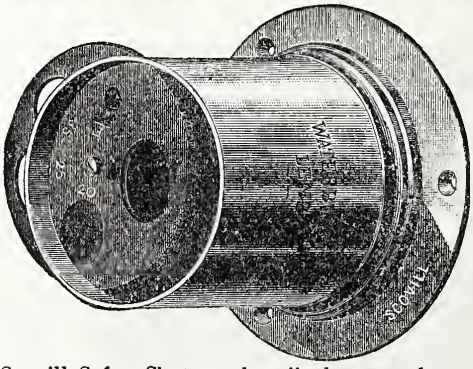
USE

VROOM & FOWLER'S

SHAVING SOAP.

CHAS. H. RUTHERFORD, No. 12 Gold St., NEW YORK.

WATERBURY LENSES.



THE Waterbury Lenses are composed of a bi-convex crown glass lens cemented to another lens of the plano-convex form, made of the best selected flint-glass.

Owing to the great advances in the sensitiveness of emulsion plates, the Waterbury Lenses are now commonly used for groups and for instantaneous views, with the Scovill Safety Shutters described on another page.

A, Single, for 4x5 plate	$3 50
A, Matched pair, stereoscopic	7 00
B, Single, for 5x8 plate	4 50
B, Single, with patent shutter	5 50
BB, Single, for 6½x8½ plate	6 00
C, Single, for 8x10 plate	8 00

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Architects' Orders Executed Promptly. Satisfaction Guaranteed.

SAMUEL FRANKENHEIM,

Practical Photographer,

Photo=Printing, View=Photographing, Developing, Bromide Enlarging, Copying, Etc.

45 FULTON STREET, Near Pearl St., NEW YORK.

Everything appertaining to Photography can be and is done on the premises.

R. A. MORRISON. HUGH MORRISON. W. HOWARD MORRISON.

HUGH MORRISON & SONS,

IMPORTERS AND DEALERS IN

Photographic Supplies, Lenses and Cameras,

ALSO DEALERS IN EVERY VARIETY OF

Etchings, Mouldings, Easels, Etc.

10 SIXTH STREET, PITTSBURGH.

FOR THE LADIES.

PETITE OUTFIT.

Consisting of 3¼ x 4¼ Single Swing Petite Camera, made of mahogany, polished, with folding platform, patent latch for ditto, double dry-plate holder with registering slides, one jointed adjustable tripod, one 3¼ x 4¼ Optimus Instantaneous Lens.

Price, complete, $25.00.

When sold separately the total cost of the parts of this outfit is $36.00.

MIGNON OUTFIT.

Consisting of 3¼ x 4¼ Mignon Camera, made of mahogany, finely polished, with folding platform, patent latch for ditto, rack and pinion focusing adjustment, double dry-plate holder with registering slides, one jointed adjustable tripod, one 3¼ x 4¼ Optimus Instantaneous Lens.

Price, complete, $36.00.

When sold separately the total cost of the parts of this outfit is $48.00.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

THE CARBON STUDIO,

130 West 23d St., New York.

Reproductions of Oil Paintings, Water Colors, Engravings and Etchings. Permanent Carbon Prints made in all colors. Photographs copied or enlarged.

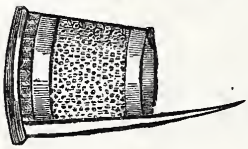
SPECIAL ARRANGEMENTS WITH ARTISTS FOR PUBLISHING AND COPYRIGHTING THEIR WORKS.

THE SCOVILL HANDY FLASHER

has been tried with safe "flash" mixtures like the Scovill Magnesium Compound, and invariably has given successful results. There is no device intended to accomplish the same purpose which is so convenient and portable. In fact it folds so compactly that it has been styled the "pocket flasher." A still more important consideration in its favor is that it may be so held as to throw the light downward, and thus avoid shadows. This is very important when flash photographs are made where there are light hangings and wall in the background. Some expert photographers attach a piece of cardboard to the handles of this flasher to serve as a reflector. The Asbestos plates furnished and the use of fuse serve as additional safeguards to the operators.

Price, Handy Flasher, - $0.75

Scovill's Efficient Plate Lifter.



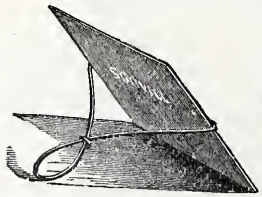
This Plate Lifter is very nearly like an ordinary open end **Thimble** with a **Pointed piece of Metal** soldered securely to it as shown in the illustration.

Where a number of plates are developed in one dish, this Plate Lifter is not only a convenience, but quite a necessity.

Price, 15 cents each.

For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

By using the **RUSSELL NEGATIVE CLASP** and **DRYING SUPPORT,** there is no need of wetting or staining the fingers in the developer, or of touching a plate until after it has been developed, varnished and dried. Adaptable for all sizes, from 3¼x4¼ to 8x10 inclusive. Price, 15c. each.



For Sale by all Dealers in Photographic Materials and The Scovill & Adams Company.

Howland and Chadwick DEALERS IN

Photographic Supplies,

211 South Main St.,
Opp. the Cathedral,

LOS ANGELES, CAL.

Charles W. Whittlesey & Co.

281 STATE STREET, *NEW HAVEN, CONN.*

Photographic Supplies.

Printing, Developing and Mounting promptly and neatly done.

WM. P. BRIGDEN,

ARCHITECTS' PERSPECTIVES

General Designer AND Book Illustrator,

In Pen-and-Ink and Water Colors.

No. 4 WARREN STREET, NEW YORK CITY.

GEO. M. BABB,

DEALER IN

AMATEUR AND PROFESSIONAL

Photographic Supplies

A full line of all kinds constantly kept on hand.
All orders by mail promptly attended to. Developing for Amateurs.

13½ BROMFIELD STREET, BOSTON, MASS.

o—o WE ARE o—o
HEADQUARTERS FOR **Flash Light Photography.**

McCOLLIN'S IGNITER for Blitz Pulver.....$1.50
HEMPERLY FLASH LAMP for Pure Magnesium.....2.75
BLITZ PULVER, the great Flash Powder.....per package of 20 charges, 60c.
The above are all manufactured under Patents controlled by us, and we propose to protect ourselves against infringements.

THOS. H. McCOLLIN & CO.,
PHOTOGRAPHIC SUPPLIES OF ALL KINDS,
1030 Arch Street, Philadelphia.
Send 25 cents for sample copy "American Journal of Photography."

New House.

Stephen B. Butts.
John F. Adams.

BUTTS & ADAMS,
Photographers' Supplies,
457 and 459 WASHINGTON STREET, BUFFALO, N. Y.

AMATEUR SUPPLIES
Dark Room.
Free Instruction.

THE AIR BRUSH
With extra parts for same
and free instruction.

PERMANENT!

Solar and Electric Enlargements in Platinum for Artists and the Trade.

S. A. THOMAS,
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MISS L. K. NEVIUS,

Classes for Ladies in **Painting and Photography.**

(Open from September 15 to July 1.) Classes in Oil, Water Color and Mineral Painting. Outdoor Classes in Sketching and Photography every Spring. Orders taken for China Decoration. China fired in first-class manner. Photographs colored in Oil, or Water Colors. Photos and Daguerreotypes copied. White China and Painting Materials for sale. Circulars on application. Mention TIMES Almanac.

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J. N. McDONNALD,

DEALER IN

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Opposite Union Depot Arcade,
Albany, N. Y.

Photographic Materials, Artists' Supplies and Amateur Equipments.

The oldest stock house in the vicinity.
Dark-room for use of customers.
Mail orders carefully attended to.

Send your Order TO-DAY!

SCHULTZE PHOTO-EQUIPMENT CO.

HEADQUARTERS FOR

Photographers' Requisites

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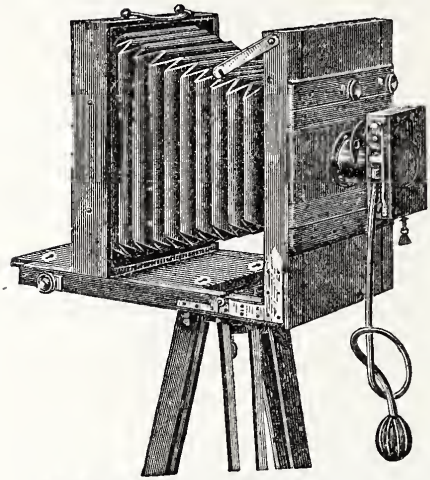

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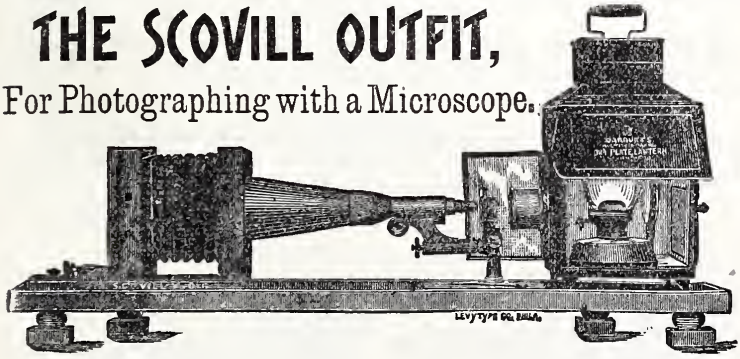

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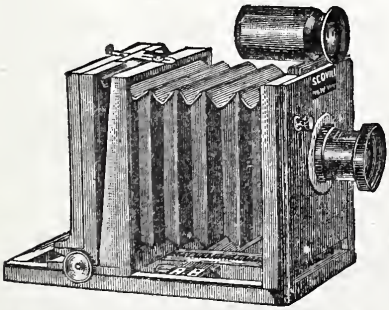

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